

Proyecto Minero Escobal
San Rafael Las Flores, Santa Rosa

Informe de Monitoreo Ambiental



Preparado para:



Ministerio de Ambiente y Recursos Naturales (MARN)

Informe Trimestral de Monitoreo Ambiental

Preparado por:



Departamento de Ambiente

San Rafael Las Flores, Santa Rosa, Guatemala

MAYO - JULIO 2016

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1 Introducción

A continuación se presenta al Ministerio de Ambiente y Recursos Naturales (**MARN**), el informe trimestral de monitoreo ambiental del Proyecto Minero Escobal (**el Proyecto**) basado en lo siguiente:

- A. Resultados obtenidos durante los monitoreos ambientales referente a la calidad del aire (material particulado, gases de combustión y niveles de presión sonora), calidad de agua, vibraciones, salud y seguridad ocupacional y geoquímica de roca llevados a cabo durante los meses de Mayo a Julio de 2016.

Esto como parte de los compromisos ambientales de Minera San Rafael, S.A. (**la Empresa**) en base a la resolución 549-2012/DIGARN/ODGR/hapc, inciso B, el cual se lee: “La entidad MINERA SAN RAFAEL, SOCIEDAD ANÓNIMA, deberá continuar realizando los monitoreos en base a lo descrito en cada una de las resoluciones citadas en el primer considerando (4590-2008/ELER/CG), (262-2011/ECM/caml), (3061-2011/DIGARN/ECM/beor), llevando su respectivo registro y presentar los resultados de los monitoreos de cada uno de los proyectos de forma trimestral”.

- ❖ Proyecto de Exploración Minera Oasis ante el MARN con base en la resolución 4590-2008/ELER/CG, compromiso número VII; el cual se lee: “llevar un monitoreo mensual de la calidad de aire y niveles de ruido en el Área de Influencia Directa (**AID**) y presentar resultados mensualmente al MARN.”
- ❖ Proyecto de Túneles de Exploración Minera Oasis ante el MARN con base en la resolución 262-2011/ECM/caml, compromiso número XII; el cual se lee: “Continuar con el programa de monitoreo de la calidad del agua y aire, implementado desde 2008.”
- ❖ Proyecto Minero Escobal ante el MARN con base en la resolución 3061-2011/DIGARN/ECM/beor, compromisos número III y número VI; los cuales se leen: “La Empresa deberá de implementar el plan de monitoreo ambiental descrito en capítulo 13 y cumplirá con los límites establecidos por el MARN, además de lineamientos internacionales como Banco Mundial, Corporación Financiera internacional (**CFI**), Agencia de Protección Ambiental de los Estados Unidos (**USEPA**), Organización Mundial de la Salud (**OMS**) y Administración de la Salud y Seguridad Ocupacional (**OSHA**), según el componente que sea monitoreado...” y “Llevar un registro documentado del caudal bombeado de los pozos de abastecimiento y del agua bombeada desde los túneles hacia las piletas, así como de las descargas y los parámetros de descarga...”.

- B.** Resultados de calidad de agua y de calidad de aire, como parte de los compromisos ambientales de la empresa ante el MARN con base en la resolución 3061-2011/DIGARN/ECM/beor, compromisos número XXXI; el cual se lee: “Presentar los informes de monitoreo de la calidad del agua de los cuerpos naturales de agua potencialmente afectados por las actividades del proyecto y de la calidad del aire a este Ministerio en forma anual.”
- C.** Copia de registro documentado del caudal bombeado desde los túneles hacia la planta de tratamiento y de su descarga hacia la Quebrada Escobal, como parte de los compromisos ambientales de la empresa ante el MARN con base en la resolución 3061-2011/DIGARN/ECM/beor, compromisos número VI; el cual se lee: “llevar un registro documentado del caudal bombeado de los pozos de abastecimiento y del agua bombeada desde los túneles hacia las piletas, así como de las descargas y los parámetros de descarga, remitiendo a este Ministerio una copia mensual de estos registros.”

El contenido del presente informe corresponde a la evaluación de los siguientes componentes ambientales:

- Calidad de Aire: Se monitorearon nueve estaciones ubicadas dentro del área de Influencia (**AI**) del proyecto para medir la concentración de material particulado igual o menor a 10 micrómetros (**PM₁₀**), en microgramos por metro cúbico (**µg/m³**). También se monitorearon siete estaciones para medir la concentración de metales en **PM₁₀**, sólidos sedimentables totales (**PST**), y gases de combustión: dióxido de azufre (**SO₂**) y óxidos nitrosos (**NO_x**).
- Calidad de Presión Sonora: Se monitorearon nueve estaciones ubicadas dentro del ID del proyecto, para determinar los niveles de presión sonora, en decibeles escala A (**dBa**) y respuesta lenta.
- Calidad de Agua: Se tomaron muestras en 11 estaciones de agua superficial, 5 estaciones de agua subterránea (manantiales), 2 estaciones de pozos de producción y 11 estaciones de agua en pozos de monitoreo ubicadas en el AID del proyecto.
- Sedimentos: Se tomaron muestras de sedimentos en las mismas estaciones de agua superficial ubicadas en el AI del proyecto.
- Calidad de Efluente: Se tomaron muestras mensuales en el efluente de la Planta de tratamiento de aguas proveniente de túneles y del agua contenida en la pileta de cumplimiento ambiental. En el anexo 11.2 se presenta una copia de los registros diarios.

- Vibraciones: Se instalaron tres medidores de vibraciones, los cuales registraron la velocidad de partícula durante cada una de las voladuras. En total se registraron 842 voladuras durante los meses de Mayo a Julio de 2016.
- Geoquímica de roca estéril: Se analizó el pH en pasta de 28 muestras de material extraído de los túneles.
- Mediciones de Seguridad y Salud Ocupacional: Se analizaron seis estaciones de monitoreo de presión sonora, tres estaciones de material particulado y se presenta un extracto de las mediciones rutinarias de gases para determinar ácido sulfhídrico (H₂S).
- Copia de registro documentado del caudal bombeado de los pozos del agua bombeada desde los túneles hacia las piletas. En el anexo 11.1 se presenta copia de las lecturas diarias de flujómetros y los cálculos realizados para determinar los caudales bombeados del portal Este y el portal Oeste, durante los meses de Mayo a Julio de 2016.
- Copia de registro documentado del análisis In Situ y kit de Cianuro de efluentes. En el anexo 11.2 se presenta copia de las lecturas diarias de parámetros *In Situ* (pH, temperatura, conductividad y turbidez), así como los resultados obtenidos con el Kit de Cianuro (método colorimétrico) y resultados de muestras enviadas al laboratorio ACZ para la verificación del método colorimétrico, durante los meses de Mayo a Julio 2016.

2 Condiciones Ambientales

En el Cuadro 2-1 se describen algunos parámetros meteorológicos en el área del Proyecto y de la Figura 2-1 a la Figura 2-3 se representa la dirección del viento durante Mayo a Julio de 2016.

Cuadro 2-1: Condiciones meteorológicas, Proyecto Minero Escobal

Temperatura (°C)			Velocidad del viento (km/h)			Ráfagas (km/h)	Humedad relativa (%)			Precipitación (mm)
Max	Min	Media	Max	Min	Media	Max	Max	Min	Media	Total
Mayo 2016										
31.36	14.25	21.58	24.38	2.87	0.31	32.56	100	32.65	79.27	119.92
Junio 2016										
28.72	8.68	20.85	56	0.31	6.1	68.43	100	36.27	81.34	157.36
Julio 2016										
30.48	10.15	21.25	38.85	0.31	9.66	67.17	100	22.97	71.78	44.78

°C = grados centígrados. Km/h = kilómetros por hora. % = porcentaje. mm = milímetros. Max = valor máximo. Min = valor mínimo. Fuente: MSR, 2016.

Durante el trimestre se registró una temperatura promedio de entre los 20.85° a los 21.58°C y en el mes de Julio se registró la menor precipitación (44.78mm). El mes que mayor humedad relativa promedio presentó fue Junio con 81.34% y el mes que en promedio presentó la mayor velocidad de vientos fue Julio con 9.66 km/h. En la Fotografía 2-1 se muestra la ubicación de la estación meteorológica, donde se registran las condiciones ambientales que se reportan.



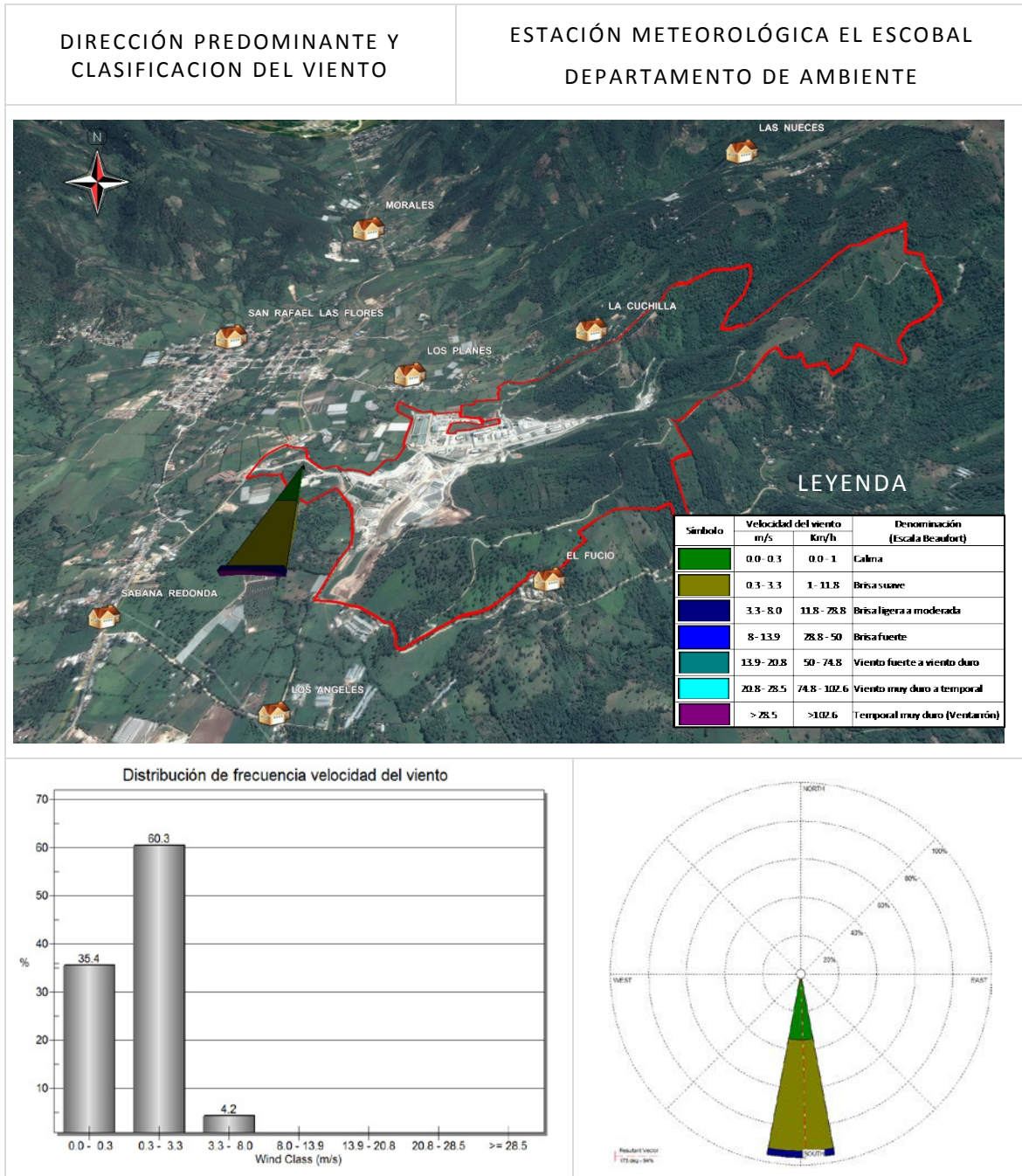
Fotografía 2-1: Estación meteorológica Escobal, San Rafael Las Flores, Santa Rosa

Fuente: MSR, 2016.

Como se puede observar en la Figura 2-1, Figura 2-2 y Figura 2-3 la predominancia de los vientos del trimestre de Mayo a Julio de 2016 fue de norte a sur.

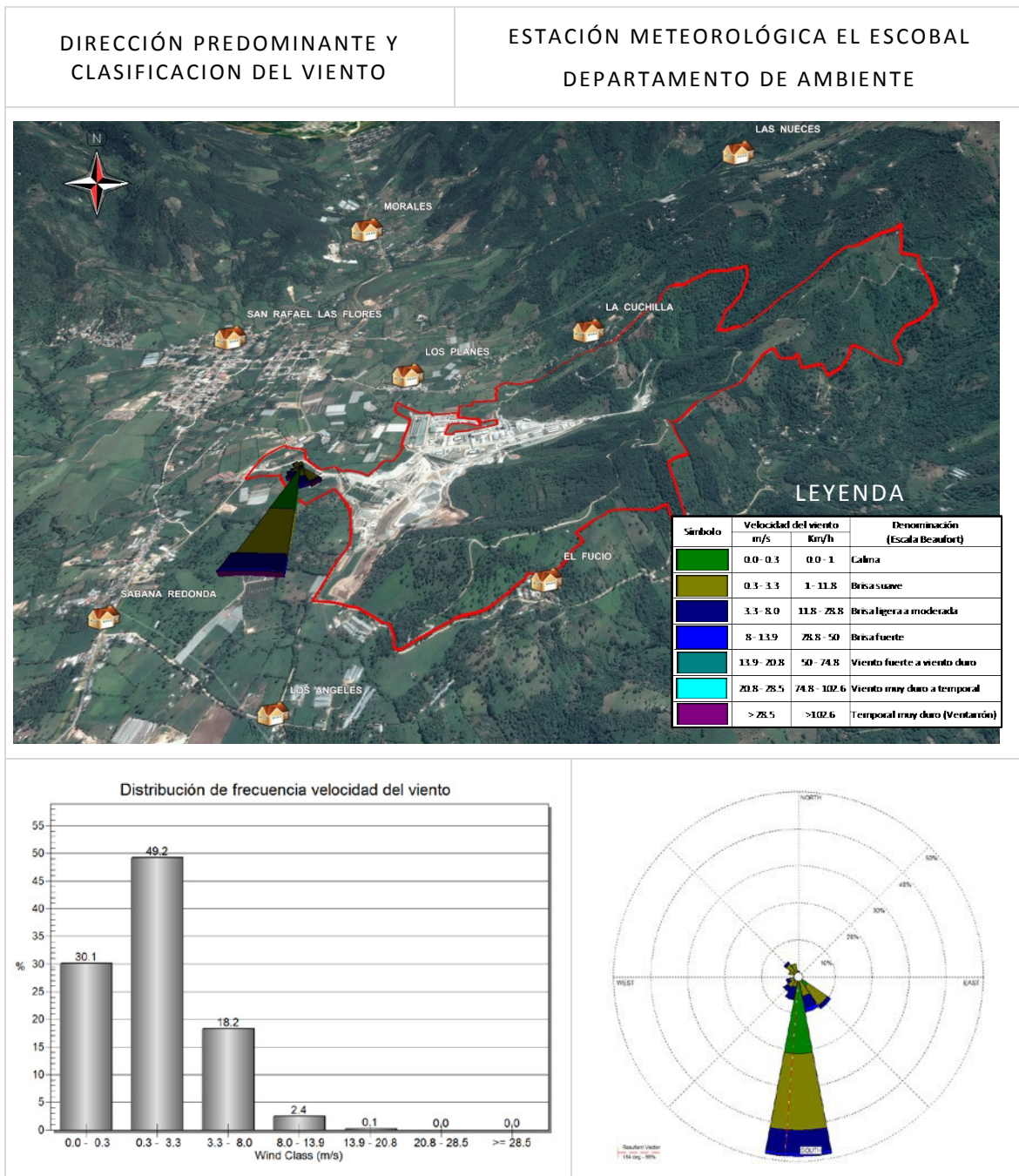
Figura 2-1: Dirección del viento Mayo 2016, Proyecto Minero Escobal

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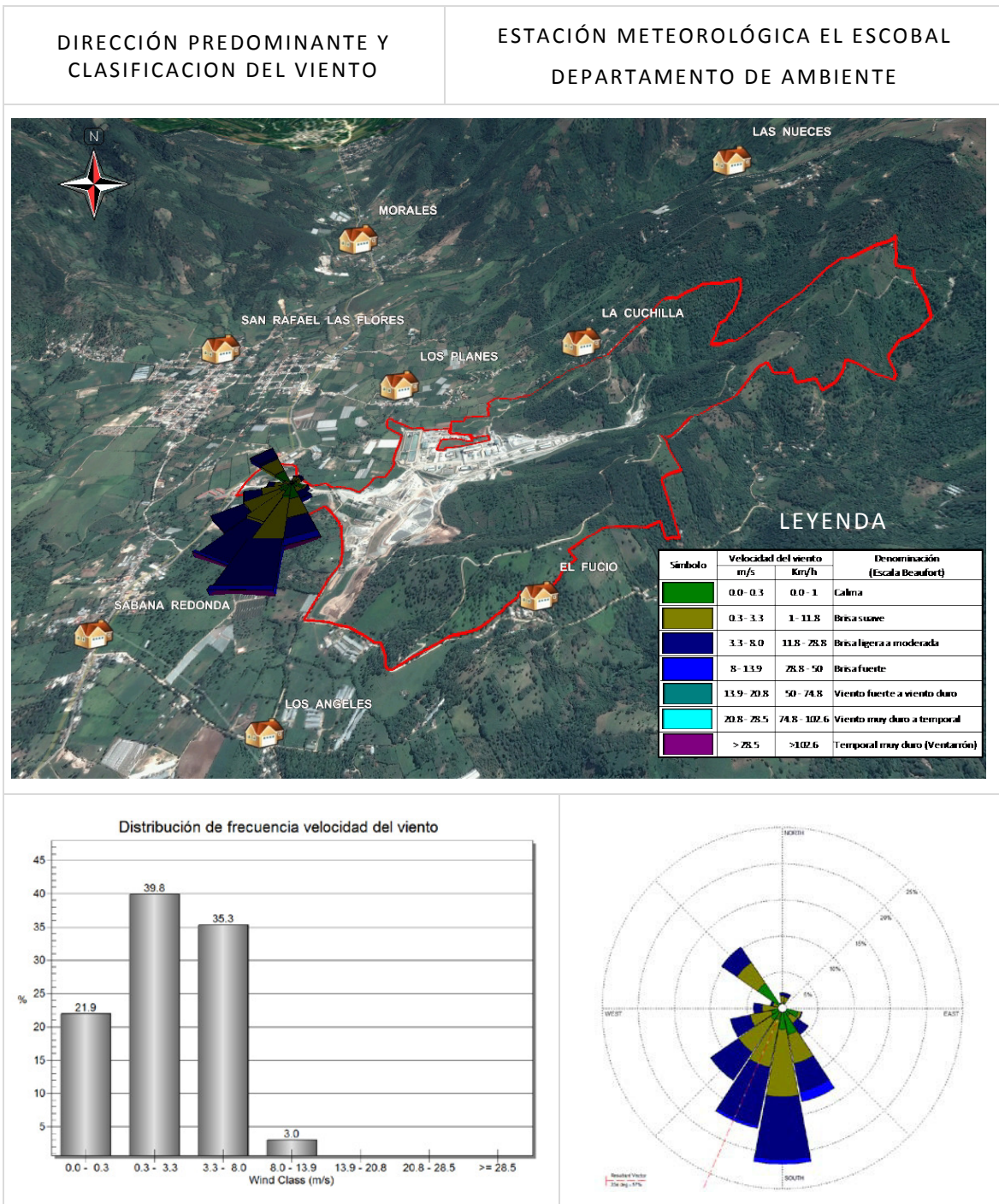
Fuente: MSR, 2016.

Figura 2-2: Dirección del viento Junio 2016, Proyecto Minero Escobal



Fuente: MSR, 2016.

Figura 2-3: Dirección del viento Julio 2016, Proyecto Minero Escobal



Fuente: MSR, 2016.

3 Calidad de Aire

3.1 Material Particulado

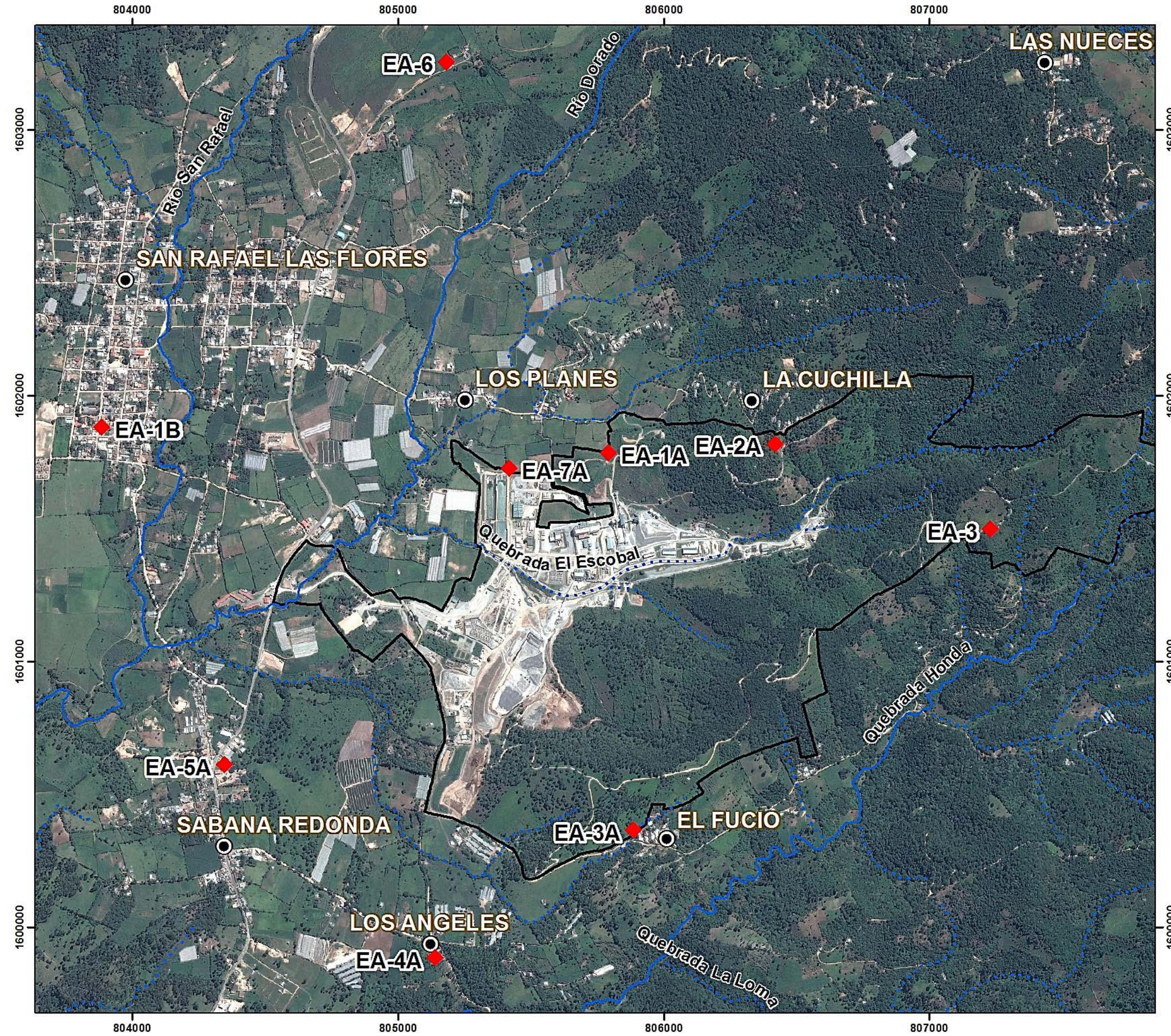
3.1.1 Sitios de Monitoreo

En el Cuadro 3-1 se enlistan las estaciones de monitoreo de material particulado (PM₁₀) menor o igual a 10 micrómetros, localizadas dentro de los terrenos de la mina y en la jurisdicción de los centros poblados ubicados en el área de influencia (AI) del Proyecto: Los Planes, La Cuchilla, El Fucío, Sabana Redonda, Portón de los Ángeles y San Rafael Las Flores. La ubicación de las estaciones de monitoreo de PM₁₀ se presenta en la Figura 3-1.

Cuadro 3-1: Sitios de monitoreo de material particulado, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio	Período línea base
Periodicidad de monitoreo mensual					
EA-1A	805,797	1,601,582	1,417	Depósito de suelos, a inmediaciones de Aldea Los Planes	Febrero 2009 a Mayo 2011
EA-2A	806,427	1,601,605	1,564	Aldea La Cuchilla	
EA-3	807,165	1,601,255	1,679	Área Este del proyecto, a inmediaciones de Aldea El Fucío	
EA-7A*	805,425	1,601,523	1,320	Al noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, Jurisdicción de Aldea Los Planes	No cuenta con línea base
Periodicidad de monitoreo trimestral					
EA-1B	803,894	1,601,727	1,328	Poblado San Rafael Las Flores, cercano a Escuela Aldea El Fucío	No cuenta con línea base
EA-3A	806,000	1,600,108	1,416		
EA-4A	805,142	1,599,903	1,360	Caserío El Portón de los Ángeles	Enero 2011 a Abril 2011
EA-5A*	804,352	1,600,408	1,339	Aldea Sabana Redonda, al sur-oeste del proyecto	No cuenta con línea base
EA-6	805,168	1,603,247	1,434	Al norte del Proyecto, ruta a Mataquescuintla	Julio 2010 a Abril 2011

*Se incluye como período de línea base de Julio 2010 a Abril 2011 la información registrada en las estaciones EA-5 y EA-7. Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO MATERIAL PARTICULADO (PM10)

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

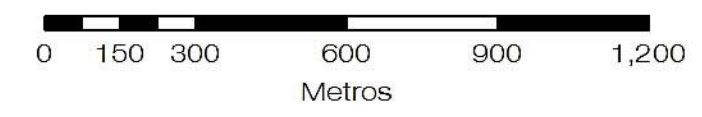
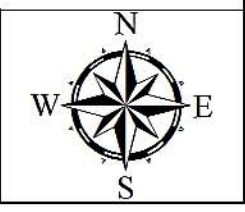
Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO (PM10)

Símbolo	Estación	X	Y
	EA-1A	805791	1601785
	EA-1B	803885	1601881
	EA-2A	806419	1601819
	EA-3	807232	1601498
	EA-3A	805886	1600364
	EA-4A	805140	1599883
	EA-5A	804346	1600611
	EA-6	805181	1603257
	EA-7A	805419	1601726

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 Mataquesuinta (2159-1) y Laguna de Ayarza (2159-1) del IGN, Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014. datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016
Distancia Horizontal y Vertical de Grilla: 1,000 metros
Escala 1:15,000



3.1.2 Metodología

En el Cuadro 3-2 se describe el procedimiento, parámetros y equipo utilizados en la medición de PM₁₀.

Cuadro 3-2: Procedimiento y equipo utilizado para medición de material particulado, Proyecto Minero Escobal

Parámetros utilizados	
PM ₁₀	Material particulado igual o menor a 10 micrómetros ($\leq 10 \mu\text{m}$).
Procedimiento	
La medición se realiza haciendo pasar un flujo continuo de aire durante 24 ± 1 horas por un filtro de fibra de vidrio que ha sido pesado inicialmente en un laboratorio equipado para realizar el análisis gravimétrico correspondiente; luego de la toma de muestra, el filtro es enviado de nuevo al mismo laboratorio para determinar su peso final. Con los datos obtenidos del muestreo y del análisis gravimétrico, se determina la concentración de PM ₁₀ . El equipo de medición utilizado cumple con las especificaciones de la Agencia de Protección Ambiental de los Estados Unidos (EPA).	
Equipo utilizado	
Nombre	PM ₁₀ Air Sampler
Modelo	PQ 200
Fabricante	BGI INSTRUMENTS
Laboratorio contratado	
Nombre	Laboratorio Ambiental, S.A. Laboratorio respaldado por un Sistema de Calidad ISO 17025, otorgado por la Oficina Guatemalteca de Acreditación (OGA); y con ello los análisis acreditados (análisis gravimétrico de filtros) cuentan con validez internacional según OGA-LE 050-12.

Fuente: MSR, 2016.

3.1.3 Resultados

En el Cuadro 3-3 se presentan los resultados de PM₁₀ durante los meses de Mayo a Julio de 2016 y los resultados de laboratorio del análisis gravimétrico de filtros y los cálculos realizados para determinar el PM₁₀ se presentan en el anexo 11.3.1.

Los valores de PM₁₀ registrados durante el monitoreo realizado en todas las localidades, se encuentran dentro de los valores máximos permisibles, conforme a los valores establecidos por la EPA y el Banco Mundial ($150 \mu\text{g}/\text{m}^3$).

Cuadro 3-3: Resultados de PM₁₀, Proyecto Minero Escobal

Estación	Norma*	Guías*		Línea Base			Resultados		
	USEPA ¹	Banco Mundial ²	OMS ³	Promedio	Máximo	Mínimo	May-16	Jun-16	Jul-16
				(µg/m ³)					
EA-1A	150	150**	50	24.36	89.95	3.67	34.71	23.29	22.05
EA-1B				NR	NR	NR	54.96	NA	NA
EA-2 ^a				21.40	76.20	2.74	50.06	17.07	16.57
EA-3				25.68	78.85	1.25	51.42	17.33	10.89
EA-3 ^a				NR	NR	NR	60.36	NA	NA
EA-4 ^a				103.55	120.40	86.70	61.76	NA	NA
EA-5 ^a				50.73 [¥]	104.80 [¥]	11.80 [¥]	45.8	NA	NA
EA-6				23.05	57.90	1.70	54.07	NA	NA
EA-7 ^a				46.48 [¥]	115.90 [¥]	13.40 [¥]	25.13	22.05	42.43

µg/m³ = microgramos por metro cúbico. NR = cálculo No Realizado por falta de datos de línea base. NA = No Analizado. ¹USEPA, 2006. Normas nacionales de calidad de aire ambiental (NAAQS), 40 CFR parte 50 (US). ²Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. ³Guía de Calidad del Aire, OMS 2005.* Las normas de calidad de aire ambiental son los niveles de calidad del aire fijados y publicados a partir de procesos legislativos nacionales y procesos regulatorios, mientras que las guías sobre calidad del aire ambiental hacen referencia a niveles de calidad del aire obtenidos principalmente a través de datos clínicos, toxicológicos y epidemiológicos. ** este valor corresponde al límite provisional 1 dado por esta guía. ¥: Corresponde a los valores de línea base de la estación EA-5 y de la estación EA-7 respectivamente. Fuente: MSR, 2016.

Los resultados obtenidos durante los meses de Mayo a Julio de 2016 se encontraron entre los 10.89 a 61.76 µg/m³. En Mayo se registró el menor valor de PM₁₀ en la estación EA-7A (25.13 µg/m³), mientras que en Junio y Julio se registró en la estación EA-2A y EA-3 (17.07 y 10.89 µg/m³ respectivamente). Los valores más altos de PM₁₀ se registraron en la estaciones EA-4A durante Mayo (61.76 µg/m³), mientras que los valores más altos en Junio y Julio se registraron en las estaciones EA-1A y EA-7A (23.29 y 42.43 µg/m³) respectivamente. Todos los valores de PM₁₀ registrados durante el monitoreo trimestral, se encuentran por debajo de los límites máximos establecidos durante el levantamiento de línea base.

3.2 Metales en Material Particulado

3.2.1 Sitios de Monitoreo

En el Cuadro 3-4 se enlistan las estaciones de monitoreo de metales en material particulado menor o igual a 10 micrómetros (PM₁₀) localizadas dentro de los terrenos de la mina y en la jurisdicción de los centros poblados ubicados en el área de influencia (AI) del Proyecto: Los Planes, La Cuchilla, El Fucío, Sabana Redonda, Portón de los Ángeles y San Rafael Las Flores. La ubicación de las estaciones de monitoreo de metales se presenta en la Figura 3-1.

Cuadro 3-4: Sitios de monitoreo de metales en PM₁₀, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio	Período línea base
EA-1B	803,891	1,601,678	1,328	Poblado San Rafael Las Flores, cercano a Escuela	No cuenta con línea base
EA-2ª	806,427	1,601,605	1,564	Aledaño a Aldea La Cuchilla	Julio 2010 a Abril 2011
EA-3ª	805,892	1,600,161	1,416	Aledaño a Aldea El Fucío	No cuenta con línea base
EA-4ª	805,146	1,599,680	1,360	Caserío El Portón de los Ángeles	Enero 2011 a Abril 2011
EA-5A*	804,352	1,600,408	1,339	Aldea Sabana Redonda, al sur-oeste del proyecto	No se cuenta con línea base.
EA-6	805,187	1,603,054	1,434	Al norte del Proyecto, ruta a Mataquescuintla	Julio 2010 a Abril 2011
EA-7A*	805,425	1,601,523	1,320	Al noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, Jurisdicción de Aldea Los Planes	No se cuenta con línea base

*Se incluye como período de línea base de Julio 2010 a Abril 2011 la información registrada en las estaciones EA-5 y EA-7. Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Nota: 1er y 3er trimestre del año se analiza metales totales, 2do y 4to trimestre únicamente mercurio total. El análisis del laboratorio es destructivo, por tanto es imposible analizar metales y mercurio en un mismo filtro. Fuente: MSR, 2016.

3.2.2 Metodología

En el Cuadro 3-5 se describe el procedimiento, parámetros y laboratorio empleado para la determinación de metales en PM₁₀.

Cuadro 3-5: Procedimiento y laboratorio empleado para la determinación de metales en PM₁₀, Proyecto Minero Escobal

Parámetros utilizados	
Metales en PM ₁₀	Al, Sb, As, S, Ba, Be, Bi, B, Cd, Ca, Cr, Co, Cu, Sn, Sr, P, Fe, Mg, Mn, Mo, Ni, Ag, Pb, K, Se, Si, Na, Tl, Ti, V, Zn, Zr
Procedimiento	
Los mismos filtros empleados para determinar el PM ₁₀ del muestreo trimestral, son enviados al laboratorio para determinar la cantidad de metales por el método analítico EPA 6010Bmod y EPA 6020mod, los resultados se dan en µg por filtro. Este peso se divide por el volumen de aire muestreado para obtener la concentración en µg/m ³ . El análisis de laboratorio es destructivo, lo que hace imposible analizar metales y mercurio en un mismo filtro. Por tanto en el 1er y 3er trimestre del año se analizan metales totales y en el 2do y 4to trimestre únicamente mercurio total.	
Laboratorio	
Nombre	Laboratorio Ambiental S.A. (parte de CTA). Laboratorio respaldado por un Sistema de Calidad ISO 17025, otorgado por la Oficina Guatemalteca de Acreditación (OGA) y con ello los análisis acreditados (análisis gravimétrico de filtros) cuentan con validez internacional según OGA-LE 050-12.

Fuente: MSR, 2016.

3.2.3 Resultados

En el Cuadro 3-6 se presentan los resultados de concentración de mercurio en PM₁₀ durante el mes de Mayo de 2016, los resultados de laboratorio del análisis de metales en filtros y los cálculos realizados para determinar el PM₁₀ se presentan en el anexo 11.3.2. En todas las estaciones se registró mercurio ligeramente por encima del límite de detección del método, a excepción de la estación EA-2A en donde no se registró presencia de mercurio.

Cuadro 3-6: Resultados de concentración de metales en PM₁₀, Proyecto Minero Escobal

Parámetro	EA-1B	EA-2A	EA-3A	EA-4A	EA-5A	EA-6	EA-7A
	2656-0606	2631-1414	2653-0303	2655-0505	2654-0404	2657-0707	2630-1313
Mayo 2016 (µg/m³)							
Mercurio	0.00008	N.D.	0.00029	0.00012	0.00008	0.00012	0.00004
Mayo 2015 (µg/m³)							
Mercurio	0.00037	0.00067	0.0005	0.00033	0.00021	0.00033	N.D.

ND: no detectado. LD: límite de detección. µg/m³ = microgramos por metro cúbico. Fuente: MSR, 2016.

3.3 Partículas Sedimentables Totales (PST)

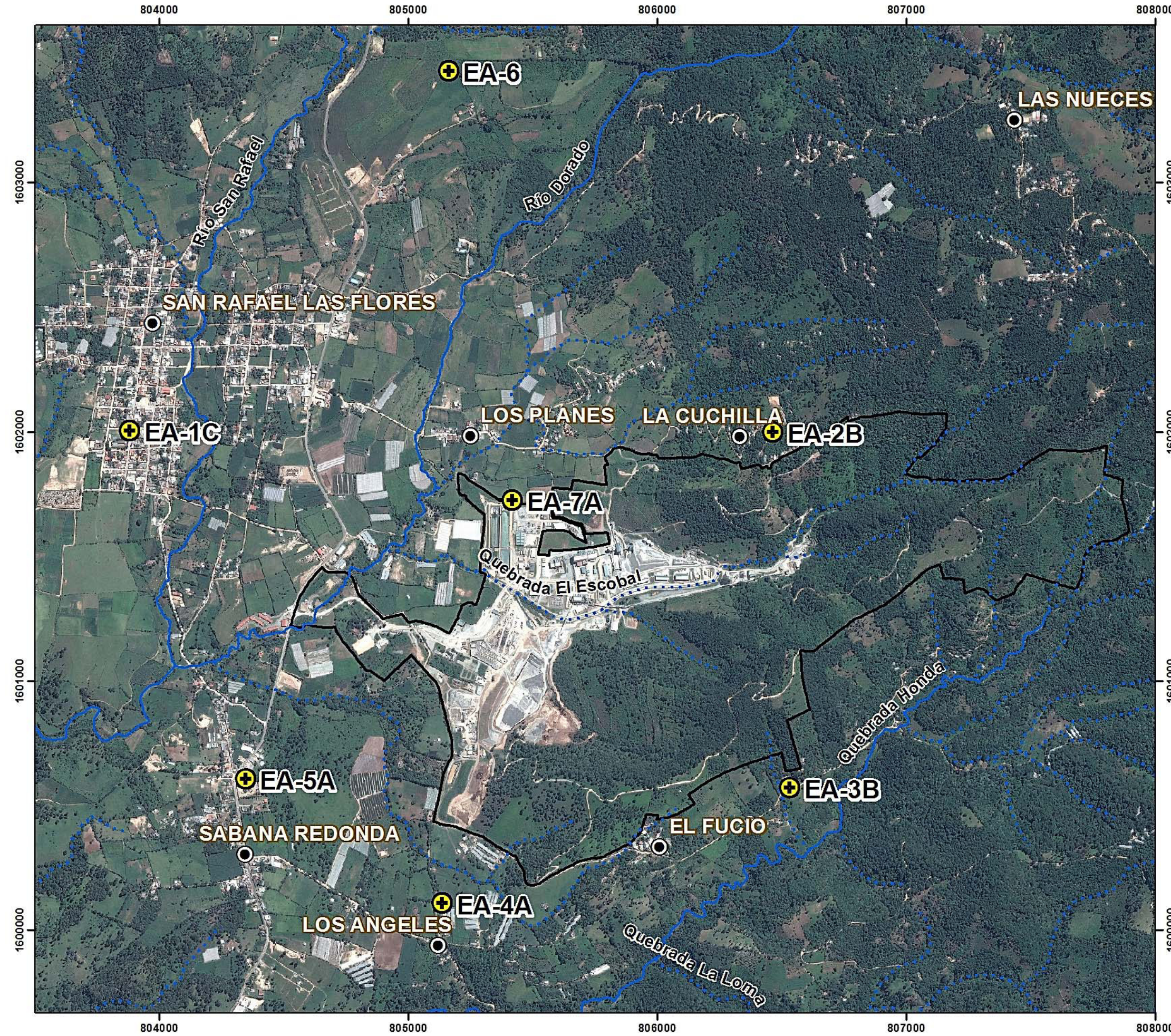
3.3.1 Sitios de Monitoreo

En el Cuadro 3-7 se enlistan las estaciones de monitoreo de PST ubicada en el área de influencia (AI) del Proyecto y su ubicación se presenta en la Figura 3-2.

Cuadro 3-7: Sitios de Monitoreo de PST, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio	Período Línea Base
EA-1C	803,887	1,601,801	1,337	Poblado San Rafael Las Flores, cercano a Escuela	No se cuenta con línea base
EA-2B	806,470	1,601,796	1,555	Aldea La Cuchilla	
EA-3B	806,538	1,600,367	1,427	Aldea El Fucío	
EA-4A	805,142	1,599,903	1,360	Caserío El Portón de los Ángeles	Diciembre 2010 a Mayo 2011
EA-5A*	804,352	1,600,408	1,339	Aldea Sabana Redonda, al sur-oeste del proyecto	No se cuenta con línea base
EA-6	805,168	1,603,247	1,434	Al norte del Proyecto, ruta a Mataquescuintla	
EA-7A	805,425	1,601,523	1,320	Noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, Jurisdicción Aldea Los Planes	

*Se incluye como período de línea base de Agosto 2010 a Mayo 2011, la información registrada en la estación EA-5. Sistema de coordenadas proyectadas UTM, DATUM WGS86. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN
ESTACIONES DE MONITOREO
DE PARTICULAS SEDIMENTABLES
TOTALES

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO

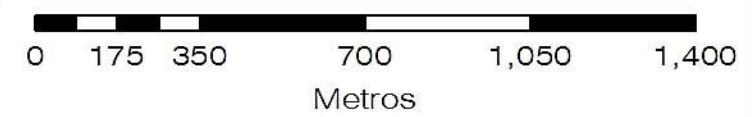
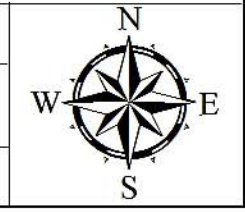
Símbolo	Estación	X	Y
	EA-1C	803881	1602004
	EA-2B	806464	1601999
	EA-3B	806532	1600570
	EA-4A	805136	1600106
	EA-5A	804346	1600607
	EA-6	805162	1603450
	EA-7A	805419	1601726

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas cartográficas año 2010 Mataquesuinta (2159-1) y Laguna de Ayarza (2159-II) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014,
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016

Distancia Horizontal y Vertical
de Grilla: 1,000 metros

Escala 1:16,000



3.3.2 Metodología

En el Cuadro 3-8 se describe el procedimiento, parámetros y equipo utilizados en la medición de PST.

Cuadro 3-8: Procedimiento y equipo utilizado para medición de PST, Proyecto Minero Escobal

Parámetros utilizados	
PST	Partículas Sedimentables Totales
Procedimiento	
Los muestreos fueron realizados por personal de la empresa Consultoría y Tecnología Ambiental (CTA), siguiendo la metodología ASTM D 1739-98 (re-aprobación 2004). La medición se realiza dejando reposar un recipiente limpio y de dimensiones conocidas en la estación de monitoreo durante un lapso de tiempo de 30 ± 2 días. El recipiente es enviado al laboratorio donde se determina los sólidos insolubles, sólidos solubles y sólidos totales que sedimentaron dentro de dicho recipiente.	
Equipo utilizado	
Nombre	High Altitude Ambient Particulate Sampler
Modelo	Diseño establecido en norma ASTM D 1739-98
Fabricante	CTA

Fuente: MSR, 2016.

3.3.3 Resultados

En el Cuadro 3-9 se presentan los resultados de Partículas Sedimentables Totales (PST) realizado durante Junio de 2016. El resumen del informe de resultados presentado por el contratista se presenta en el anexo 11.3.3.

Cuadro 3-9: Resultados de partículas sedimentables totales, Proyecto Minero Escobal

Parámetro	Norma	Guías	EA-1C	EA-2B	EA-3B	EA-4A			EA-5A				EA-6	EA-7A	
	USEPA ¹	Banco Mundial ² OMS ³	Jun-16	Jun-16	Jun-16	Línea Base			Muestreo	Línea Base			Muestreo	Jun-16	Jun-16
						Promedio	Mínimo	Máximo	Jun-16	Promedio	Mínimo	Máximo	Jun-16		
	g/(m² x 30 días)														
Sólidos insolubles	ND	ND	7.74	4.88	4.14	6.27	2.60	10.80	14.49	6.50	0.80	16.00	3.22	1.08	2.92
Sólidos solubles			2.56	1.72	1.31	2.12	0.90	2.90	3.60	11.26	2.00	37.00	1.37	0.84	1.30
Sólidos totales			10.30	6.60	5.45	8.37	4.60	13.00	18.08	17.58	3.20	50.00	4.59	1.93	4.22

¹USEPA, 2006. Normas nacionales de calidad de aire ambiental (NAAQS), 40 CFR parte 50 (US). ²Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. ³Guía de Calidad del Aire, OMS 2005. ND: estas normas y guías no establecen un límite para estos parámetros. g/(m² x 30 días)= gramos por metro cuadrado durante 30 días. Fuente: MSR, 2016.

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Los valores de PST se encuentran entre 1.93 a 18.08 g/(m² x 30 días), los cuales corresponden a las estaciones EA-6 y EA-4A respectivamente. Únicamente el valor para la estación EA-4A (18.08 g/(m² x 30 días)) se encuentra ligeramente arriba de los valores mínimos y máximos registrados durante el establecimiento de la línea base. Sin embargo, los valores de PST en la misma estación han venido descendiendo desde el cuarto trimestre de 2013. Las estaciones EA-1C, EA-2B, EA-3B, EA-6 y EA-7A no cuentan con línea base.

3.4 Gases de Combustión (SO₂ y NO₂)

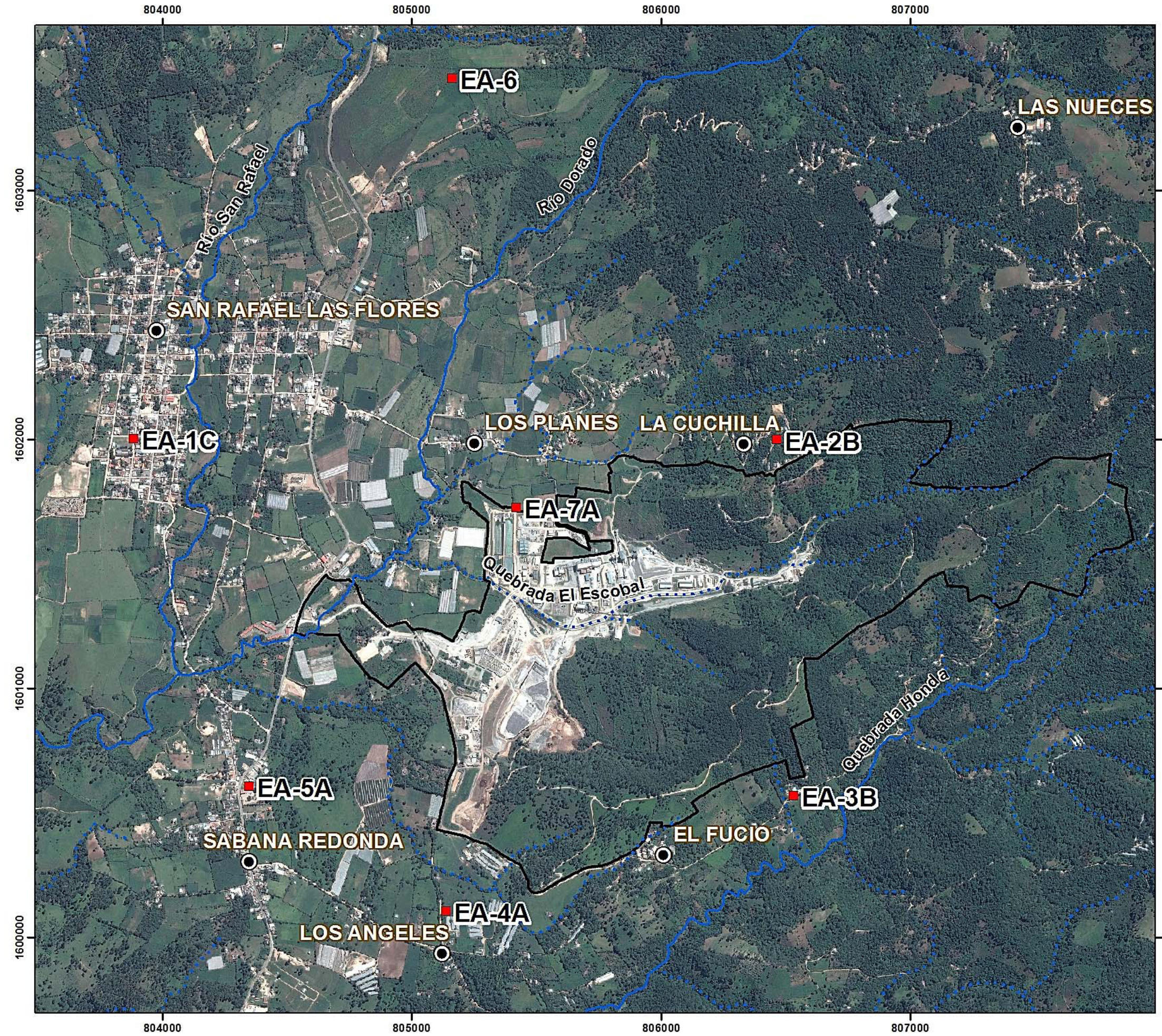
3.4.1 Sitios de Monitoreo

En el Cuadro 3-10 se enlistan las estaciones de monitoreo de dióxido de azufre (SO₂) y de dióxido de nitrógeno (NO₂) ubicada en el área de influencia (AI) del Proyecto. La ubicación de las estaciones de monitoreo de SO₂ y NO₂ se presenta en la Figura 3-3.

Cuadro 3-10: Sitios de Monitoreo de SO₂ y NO₂, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio	Período Línea Base
EA-1C	803,887	1,601,801	1,337	Poblado San Rafael Las Flores, cercano a Escuela	No se cuenta con línea base.
EA-2B	806,470	1,601,796	1,555	Aldea La Cuchilla	
EA-3B	803,887	1,601,801	1,427	Aldea El Fucío	
EA-4A	805,142	1,599,903	1,360	Caserío El Portón de los Ángeles	
EA-5A*	804,352	1,600,408	1,339	Aldea Sabana Redonda, al sur-oeste del proyecto	
EA-6	805,168	1,603,247	1,434	Al norte del Proyecto, ruta a Mataquescuintla	
EA-7A*	805,425	1,601,523	1,320	Noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, Jurisdicción Aldea Los Planes	

*Se incluye como período de línea base de Julio 2010 a Abril 2011, la información registrada en las estaciones EA-5 y EA-7. Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN
ESTACIONES DE MONITOREO
DE GASES DE COMBUSTIÓN

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

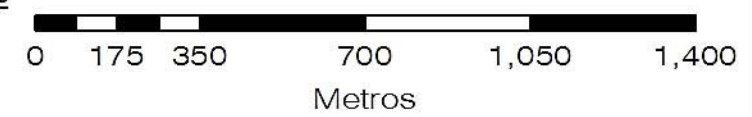
Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO

Símbolo	Estación	X	Y
	EA-1C	803881	1602004
	EA-2B	806464	1601999
	EA-3B	806532	1600570
	EA-4A	805136	1600106
	EA-5A	804346	1600607
	EA-6	805162	1603450
	EA-7A	805419	1601726

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas catográficas año 2010 Mataquesuintla (2159-1) y Laguna de Ayarza (2159-II) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014,
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016
Distancia Horizontal y Vertical
de Grilla: 1,000 metros
Escala 1:16,000



3.4.2 Metodología

En el Cuadro 3-11 se describe el procedimiento, parámetros y equipo utilizados en la medición de gases de combustión.

Cuadro 3-11: Procedimiento y equipo utilizado para la medición de SO₂ y NO₂, Proyecto Minero Escobal

Parámetros utilizados	
SO ₂	Dióxido de azufre
NO ₂	Dióxido de nitrógeno
Procedimiento	
Los muestreos fueron realizados por personal de la empresa Consultoría y Tecnología Ambiental siguiendo las metodologías: SO₂ : Metodología descrita en el CFR, del título 40, parte 50, apéndice A de la USEPA. NO₂ : Metodología descrita en el método de referencia designado por la USEPA No. EQN-1277-026.	
Equipo utilizado	
Nombre	RAC3 Gas Sampler
Modelo	209063
Fabricante	Andersen Instrument's

Fuente: MSR, 2016.

3.4.3 Resultados

En el Cuadro 3-12 se presentan los resultados de las mediciones de SO₂ y NO₂ realizadas en siete estaciones de monitoreo de Calidad de Aire. El informe de resultados presentado por el contratista se presenta en el anexo 11.3.3.

En las mediciones efectuadas durante este trimestre se obtuvieron valores por debajo del límite de detección del método en todas las estaciones para SO₂ (<13 µg/m³) y NO₂ (<9 µg/m³). Lo que indica que las actividades realizadas durante el presente período, no han variado de acuerdo a los parámetros reportados anteriormente.

Cuadro 3-12: Resultados de gases de combustión, Proyecto Minero Escobal

Parámetro	Norma*	Guías*				EA-1C	EA-2B	EA-3B	EA-4A	EA-5A			EA-6	EA-7A			
		USEPA ¹	Banco Mundial ²	OMS ³	British Columbia ⁴					Línea base**				Muestreo	Línea base**		
	Promedio					Mínimo	Máximo	Jun-16	Jun-16	Promedio	Mínimo	Máximo	Jun-16				
	(µg/m ³)																
SO ₂	370	20	20	160	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
NO ₂	100 [¥]	40 [¥]	40 [¥]	200	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9

Nota: µg/m³ = microgramos por metro cúbico; SO₂= dióxido de azufre, NO₂= dióxido de nitrógeno. ¹USEPA, 2006. Normas nacionales de calidad de aire ambiental (NAAQS), 40 CFR parte 50 (US). ²Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. ³Guía de Calidad del Aire, OMS 2005. ⁴Guías para la calidad del aire ambiental. *Las normas de calidad de aire ambiental son los niveles de calidad del aire fijados y publicados a partir de procesos legislativos nacionales y procesos regulatorios, mientras que las guías sobre calidad del aire ambiental hacen referencia a niveles de calidad del aire obtenidos principalmente a través de datos clínicos, toxicológicos y epidemiológicos. **Corresponde a los valores de línea base de la estación EA-5 y de la estación EA-7 respectivamente. ¥ Este valor corresponde a la concentración promedio anual. Fuente: MSR, 2016.

3.5 Niveles de Presión Sonora

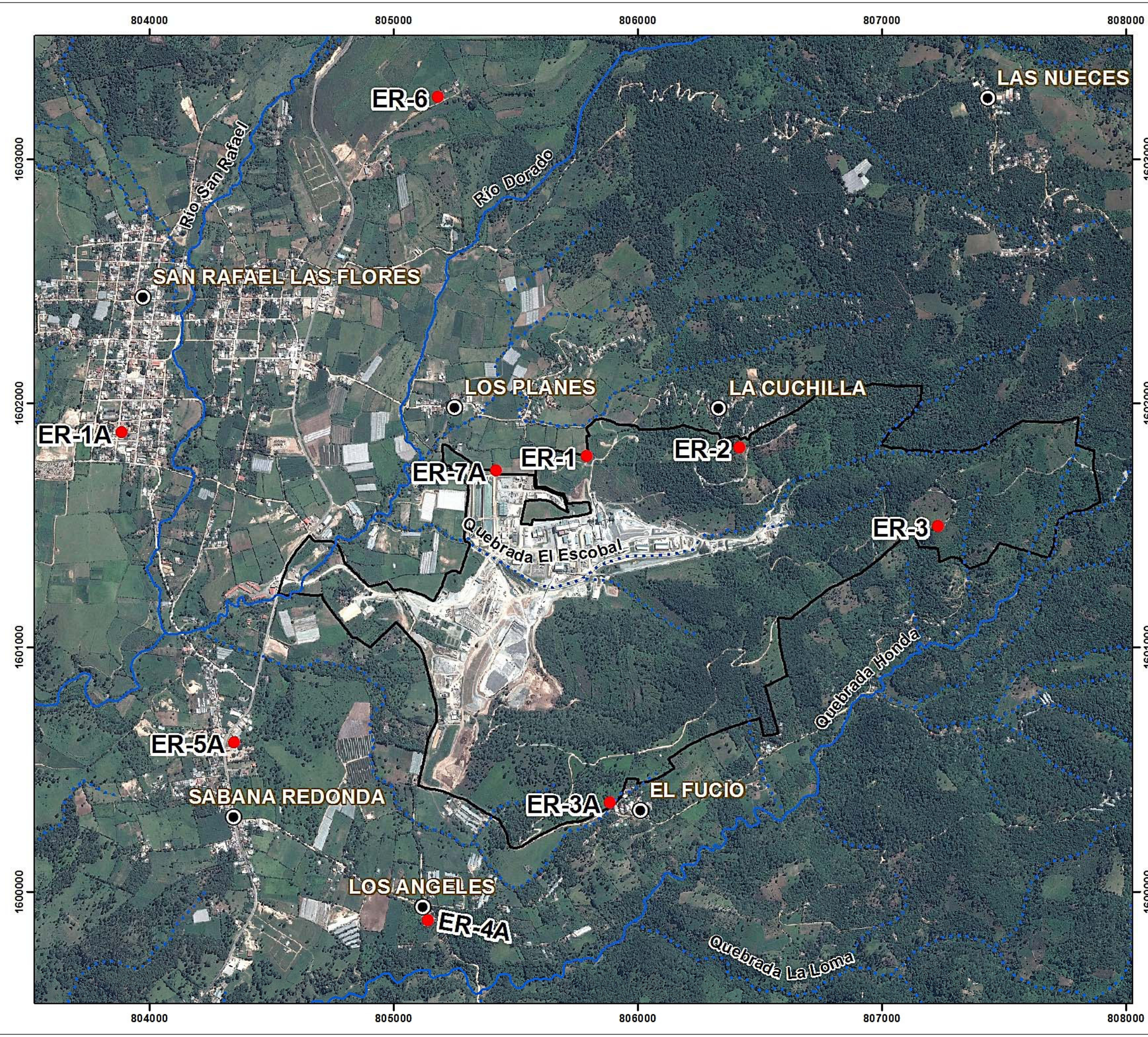
3.5.1 Sitios de Monitoreo

En el Cuadro 3-13 se enlistan las estaciones de monitoreo de presión sonora ubicados en el área de influencia (AI) del Proyecto, localizadas en la jurisdicción de los centros poblados: Los Planes, La Cuchilla, El Fucío, Sabana Redonda, Portón de los Ángeles y San Rafael Las Flores. La ubicación de las estaciones de monitoreo de presión sonora se presenta en la Figura 3-4.

Cuadro 3-13: Sitios de Monitoreo de Presión Sonora, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio
Periodicidad de monitoreo mensual				
ER-1	805,797	1,601,582	1,417	Depósito de suelos, a inmediaciones de Aldea Los Planes
ER-2	806,427	1,601,605	1,564	Aldea La Cuchilla
ER-3	807,165	1,601,255	1,679	Área este del proyecto, a inmediaciones de Aldea El Fucío
ER-7A	805,425	1,601,523	1,320	Al noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, Jurisdicción de Aldea Los Planes
Periodicidad de monitoreo trimestral				
ER-1A	803,891	1,601,678	1,328	Poblado San Rafael Las Flores, cercano a Escuela
ER-3A	805,892	1,600,161	1,416	Aldea El Fucío
ER-4A	805,146	1,599,680	1,360	Caserío El Portón de los Ángeles
ER-5A	804,352	1,600,408	1,339	Aldea Sabana Redonda, al sur-oeste del proyecto
ER-6	805,187	1,603,054	1,434	Al norte del Proyecto, ruta a Mataquesuintla

Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO NIVELES DE PRESIÓN SONORA

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

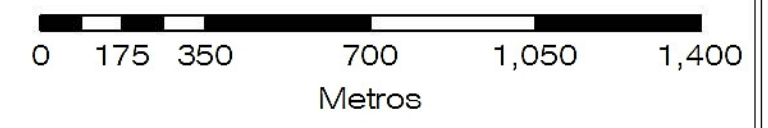
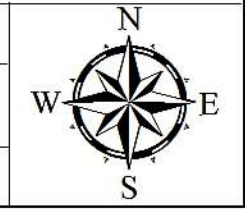
Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO

Símbolo	Estación	X	Y
	ER-1	805791	1601785
	ER-1A	803885	1601881
	ER-2	806419	1601819
	ER-3	807232	1601498
	ER-3A	805886	1600364
	ER-4A	805140	1599883
	ER-5A	804346	1600611
	ER-6	805181	1603257
	ER-7A	805419	1601726

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas cartográficas año 2010 M ataquescuinta (2159-1) y Laguna de Ayarza (2159-II) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014,
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016
Distancia Horizontal y Vertical de Grilla: 1,000 metros
Escala 1:16,000



3.5.2 Metodología

En el Cuadro 3-14 se describe el procedimiento, parámetros y equipo utilizado en la medición de los niveles de presión sonora ubicados dentro del AI del Proyecto.

Cuadro 3-14: Procedimiento y equipo utilizado para medición de presión sonora, Proyecto Minero Escobal

Parámetros analizados	
L _{MAX}	Dato máximo durante 24 horas.
L _{MIN}	Dato mínimo durante 24 horas.
L _{EQ}	Promedio ponderado equivalente de datos.
Promedio Diurno	Promedio ponderado equivalente de datos de 07:00 am a 10:00 pm
Promedio Nocturno	Promedio ponderado equivalente de datos de 10:00 pm a 07:00 am
Procedimiento	
La medición del nivel de presión sonora se realiza durante 24 horas, efectuando lecturas de decibeles en escala "A" en respuesta lenta en intervalo de 10 minutos. Los datos obtenidos en las mediciones son crudos y automáticamente grabados en el equipo, los cuales se descargan a una computadora utilizando el programa Quest Professional II. Solamente el promedio diurno y nocturno son calculados por separado.	
Equipo utilizado	
Nombre	Sound Pro
Modelo	SE/DL
Fabricante	Quest Technologies, Inc.

Fuente: MSR, 2016.

3.5.3 Resultados

En el Cuadro 3-15 y en el Cuadro 3-16 se presentan los valores registrados de los niveles de presión sonora (**NPS**) durante los meses de Mayo a Julio de 2016. Los informes generados por los equipos de medición se presentan en el anexo 11.3.4.

Los resultados obtenidos de NPS en las estaciones muestreadas respecto al parámetro Leq, están dentro del rango de 42.9 dBa y 88.5 dBa, los cuales corresponden a las estaciones ER-6 y ER-7A respectivamente.

La estación ER-6 presentó el menor promedio diurno (43.8 dBa) y el menor promedio nocturno (41.1 dBa) de todas las mediciones efectuadas durante el monitoreo; mientras que la estación ER-7A presentó el mayor promedio diurno (90.6 dBa) y el mayor promedio nocturno (63.8 dBa) se registró en la estación ER-1.

Las estaciones ER-1, ER-2, ER-3, ER-4A, ER-5A y ER-7A presentaron valores de promedio diurno y nocturno dentro de los valores mínimos y máximos registrados en el establecimiento de la línea base, a excepción de las mediciones en promedio diurno de Junio en la estación ER-1, lo registrado en Junio y Julio en la estación ER-2, lo registrado en Mayo en la estación ER-4A y las tres mediciones en la estación ER-7A; respecto de las mediciones en promedio nocturno que están fuera del límite máximo de línea base se encuentran lo registrado en Junio en la estación ER-1, a las mediciones de Junio y Julio en ER-2 y ER-7A, y la medición de Mayo en ER-4A. Las estaciones ER-1A, ER-3A y ER-6 no cuentan con datos de línea base.

Ninguna de las estaciones monitoreadas presentó valores en promedio diurno y nocturno superiores al valor de la guía para jornada diurna y nocturna del Banco Mundial para zonas industriales (70 dBa), a excepción de la estación ER-1 y ER-4A.

Cuadro 3-15: Resultados trimestrales de los niveles de presión sonora, Proyecto Minero Escobal

Parámetro	Norma*		Guías*		ER-1						ER-2									
	USEPA ¹	OMS ²	Banco Mundial ³		Línea Base			May-16	Jun-16	Jul-16	Línea Base			May-16	Jun-16	Jul-16				
			Residencial	Industrial	Promedio	Máximo	Mínimo				Promedio	Máximo	Mínimo							
			dBA																	
Lmax	NL	NL	NL	NL	89.3	99.5	64.6	83.2	97.7	82.1	86.7	97.8	64.9	79.6	91.8	85.6				
Lmin					32.5	37.7	27.0	35.3	50.1	43.8	35.2	42.8	26.5	44.8	56.2	58.1				
Leq					49.9	57.1	41.2	45.9	63.8	48.3	49.4	58.7	39.7	52.5	62.6	64.1				
PD					55	55	55	70	50.5	59.1	39.7	45.8	63.8	48.9	48.8	57.1	39.8	52	63.1	64.2
PN					55	50	45	70	47.6	55.7	39.3	46.3	63.8	47.2	46.6	54.5	37.9	53.5	61.9	64.1

Parámetro	Norma*		Guías*		ER-3						ER-7A									
	USEPA ¹	OMS ²	Banco Mundial		Línea Base			May-16	Jun-16	Jul-16	Línea Base**			May-16	Jun-16	Jul-16				
			Residencial	Industrial	Promedio	Máximo	Mínimo				Promedio	Máximo	Mínimo							
			dBA																	
Lmax	NL	NL	NL	NL	87.4	100.7	67.2	91.9	100.4	75.9	87.5	89.0	82.1	78.4	119.2	89.9				
Lmin					49.4	56.2	26.9	40.1	37.4	31.9	NR	NR	NR	38.5	30.9	44.9				
Leq					56.8	63.2	39.7	53.3	54.3	45.8	52.8	54.5	50.9	53.4	88.5	56.7				
PD					55	55	55	70	56.5	63.1	41.0	53.9	56.2	46.2	52.1	53.5	50.4	54.8	90.6	58.5
PN					55	50	45	70	57.2	64.0	34.1	52.2	45	45.4	49.7	50.9	48.8	49.5	48.3	48.9

*Las normas de calidad de aire ambiental son los niveles de calidad del aire fijados y publicados a partir de procesos legislativos nacionales y procesos regulatorios, mientras que las guías sobre calidad del aire ambiental hacen referencia a niveles de calidad del aire obtenidos principalmente a través de datos clínicos, toxicológicos y epidemiológicos. ¹USEPA, 2006. Normas nacionales de niveles de presión sonora. ²Guías sobre ruido comunitario, OMS 1999. ³Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. dBA = decibeles en escala A. PD = promedio diurno (de 07:00 a 22:00)- PN = promedio nocturno (de 22:00 a 7:00). Lmax = lectura máxima registrada de dBA. Lmin= lectura mínima registrada de dBA. NL = no hay límite establecido para este parámetro. NR = cálculo No Realizado por falta de datos de línea base. NA: no analizado por falla en la memoria de almacenamiento del equipo. ** Los valores de línea base corresponden a la estación ER-7. Fuente: MSR, 2016.

Cuadro 3-16: Resultados mensuales de los niveles de presión sonora, Proyecto Minero Escobal

Parámetro	Norma*		Guías*		ER-1A				ER-3A				ER-4A			
	USEPA ¹	OMS ²	Banco Mundial ³		Línea Base			May-16	Línea Base			May-16	Línea Base			May-16
			Residencial	Industrial	Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
			dBA													
Lmax								100.8				77	80.6	78.2	82.1	113.6
Lmin	NL	NL	NL	NL				47.3				29.7	NR	NR	NR	37.7
Leq					NR	NR	NR	65.8	NR	NR	NR	49.5	50.2	49.3	50.9	70.6
PD	55	55	55	70				67.2				49.6	49.5	48.4	50.4	72.6
PN	55	50	45	70				61.7				49.4	48.6	48.2	48.9	51.6

Parámetro	Norma*		Guías*		ER-5A				ER-6			
	USEPA ¹	OMS ²	Banco Mundial ³		Línea Base			May-16	Línea Base			May-16
			Residencial	Industrial	Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
			dBA									
Lmax					91.6	85.1	92.2	73.5				83.8
Lmin	NL	NL	NL	NL	NR	NR	NR	35.4				30.8
Leq					65.8	51.6	67.6	51.7	NR	NR	NR	42.9
PD	55	55	55	70	61.2	50.2	63.8	53.4				43.8
PN	55	50	45	70	62.8	45.9	65.0	45.1				41.1

*Las normas de calidad de aire ambiental son los niveles de calidad del aire fijados y publicados a partir de procesos legislativos nacionales y procesos regulatorios, mientras que las guías sobre calidad del aire ambiental hacen referencia a niveles de calidad del aire obtenidos principalmente a través de datos clínicos, toxicológicos y epidemiológicos. ¹USEPA, 2006. Normas nacionales de niveles de presión sonora. ²Guías sobre ruido comunitario, OMS 1999. ³Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. dBA = decibeles en escala A. PD = promedio diurno (de 07:00 a 22:00)- PN = promedio nocturno (de 22:00 a 7:00). Lmax = lectura máxima registrada de dBA. Lmin= lectura mínima registrada de dBA. NL = no hay límite establecido para este parámetro. NR = cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

4 Calidad del Agua

4.1 Sitios de Monitoreo

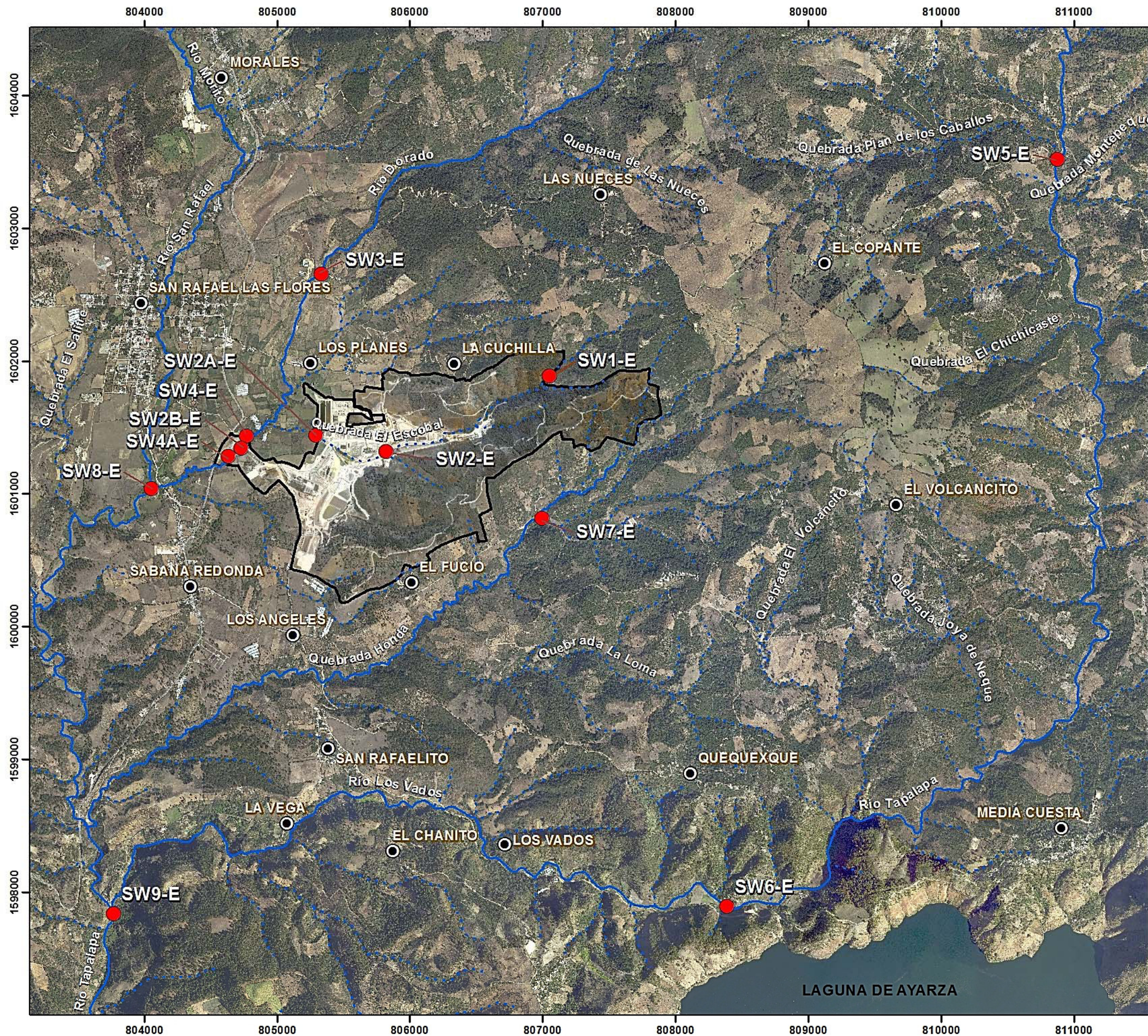
En el Cuadro 4-1 se enlistan las estaciones de monitoreo de calidad de agua superficial y subterránea localizadas en las quebradas, ríos, manantiales, pozos de monitoreo y pozos mecánicos ubicados en el área de influencia (AI) del Proyecto. La ubicación de las estaciones de monitoreo de calidad de agua superficial y subterránea se presentan en la Figura 4-1, Figura 4-2, Figura 4-3 y Figura 4-4.

Cuadro 4-1: Sitios de Monitoreo de Calidad de Agua, Proyecto Minero Escobal

Estación	Coordenadas		Sitio	Período Línea Base
Agua Superficial				
SW-1	807,053	1,601,682	Quebrada El Escobal, aguas arriba	Junio 2008 a marzo 2011
SW-2	805,811	1,601,164	Quebrada El Escobal, en medio de la propiedad	Junio 2008 a septiembre 2010
SW-2A	805,295	1,601,230	Quebrada El Escobal, salida de la propiedad	No cuenta con línea base
SW-3	805,337	1,602,453	Río El Dorado, aguas arriba	Septiembre 2008 a marzo 2011
SW-4	804,781	1,601,228	Río El Dorado, aguas abajo	
SW-4A	804,629	1,601,052	Río El Dorado, por puente de acceso al Proyecto, 30mts aguas abajo SW-4	No cuenta con línea base
SW-5	810,882	1,603,313	Río Tapalapa	Septiembre 2008 a marzo 2011
SW-6	808,391	1,597,689	Río Los Vados	
SW-7	806,989	1,600,618	Quebrada La Honda	
SW-8	804,054	1,600,834	Unión Río San Rafael y El Dorado	Noviembre 2011 a Diciembre 2012
SW-9	803,772	1,597,635	Río Tapalapa, aguas abajo (cercano a la Ceibita)	
Agua Subterránea, Nacimientos				
GW-1A	808,670	1,599,754	Nacimiento de agua permanente, Aldea El Volcancito	Diciembre 2010 a marzo 2011
GW-2	807,515	1,601,059	Nacimiento de agua permanente, Aldea El Fucío	
GW-3	806,193	1,601,194	El Mora, zona central del proyecto (frente a portal Oeste)	
GW-4	805,992	1,600,533	Aguas arriba del depósito de colas y de GW5	Diciembre 2010
GW-5	805,962	1,600,525	Aguas arriba del depósito de colas	No cuenta con línea base
Agua Subterránea, Pozos de monitoreo				
MW-2	805,206	1,600,565	Sur-oeste del depósito de colas	Diciembre 2010 a marzo 2011
MW-3	805,153	1,600,790	Al oeste del depósito de colas	
MW-4	805,186	1,601,009	Al sur de montículos (acuífero somero)	
MW-5	805,304	1,601,277	Al oeste de taller, en el límite de la propiedad de MSR	
MW-6	805,457	1,601,454	Al norte de almacén general	Diciembre 2010 a

Estación	Coordenadas		Sitio	Período Línea Base
MW-7	805,796	1,601,582	Al oeste de depósito de suelos No. 1	marzo 2011
MW-8	805,304	1,601,277	Al oeste de taller, pozo de abastecimiento de oficinas temporales	Enero 2011 a marzo 2011
MW-9	805,198	1,601,019	Al sur de montículos (Acuífero profundo)	
MW-11	805,612	1,601,064	Al norte de zona de infiltración quebrada Escobal	Marzo 2011
RW-1	804,809	1,600,972	Pozo artesanal ubicado en Finca Suandys	No cuenta con línea base
Agua Subterránea, pozo de producción				
PSA-SR	803,678	1,602,044	Pozo mecánico ubicado en las piscinas de San Rafael las Flores	Marzo 2011
PSA-1	805,212	1,601,203	Pozo mecánico ubicado a un costado de la guardería	No cuenta con línea base
Agua de grifo				
HW-1	803,888	1,601,977	Agua de grifo, casa poblado San Rafael las Flores, cercano a Escuelita	No cuenta con línea base

Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO AGUA SUPERFICIAL

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

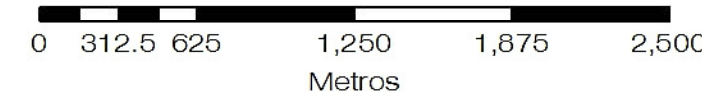
Símbolo	Estación	X	Y
	SW1-E	807047	1601885
	SW2-E	805805	1601367
	SW2A-E	805289	1601433
	SW2B-E	804728	1601341
	SW3-E	805331	1602656
	SW4-E	804775	1601431
	SW4A-E	804623	1601255
	SW5-E	810876	1603516
	SW6-E	808385	1597892
	SW7-E	806995	1600815
	SW8-E	804048	1601037
	SW9-E	803766	1597838

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas cartográficas año 2010 Mataquesuinta (2159-1) y Laguna de Ayarza (2159-II) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2013,
datos de campo del departamento de Ambiente.

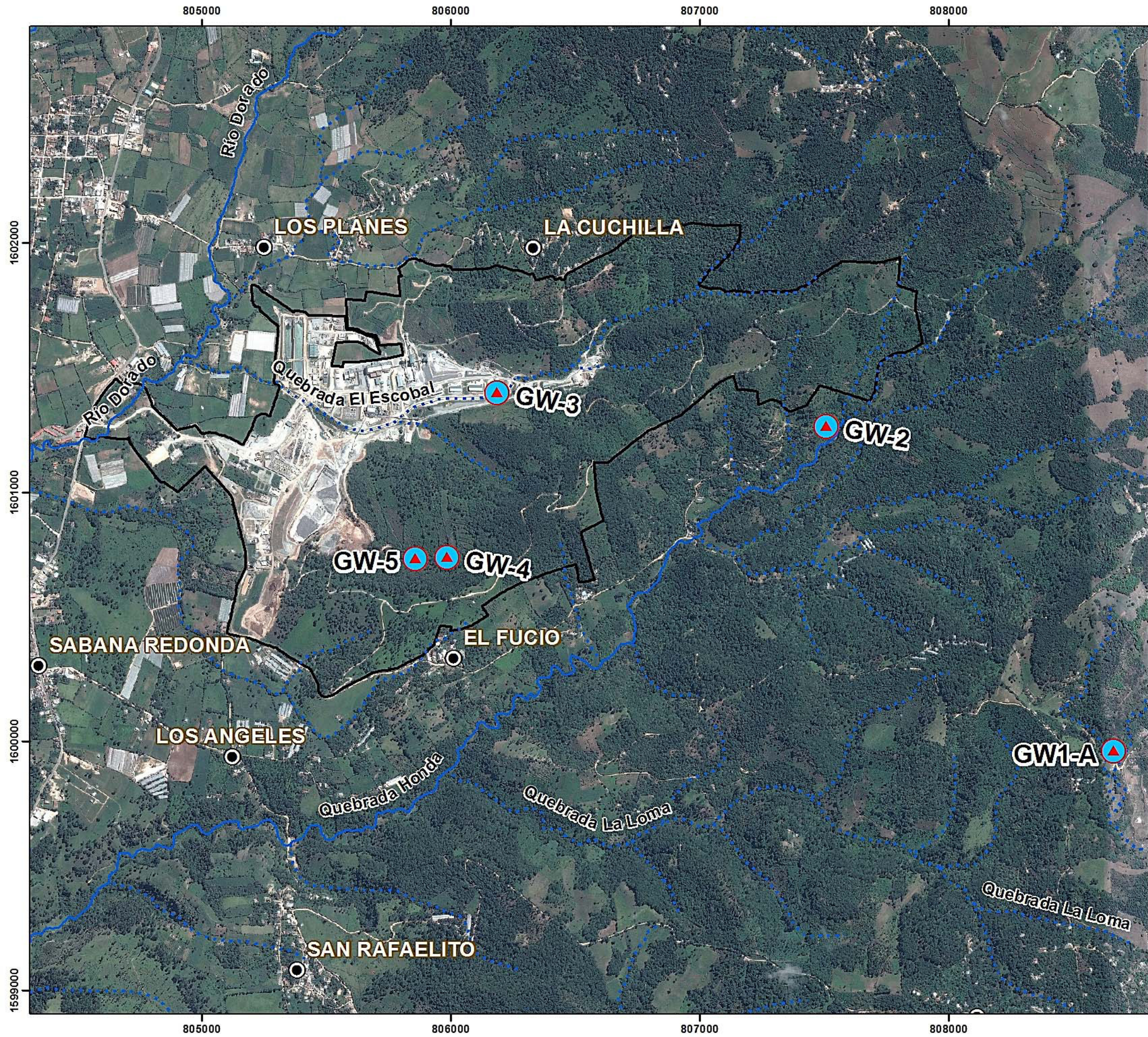
Fecha de Elaboración: Julio de 2016

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:30,000



LAGUNA DE AYARZA



MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO CALIDAD DE AGUA SUBTERRÁNEA

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



DEPARTAMENTO DE AMBIENTE

Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

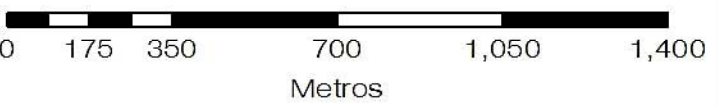
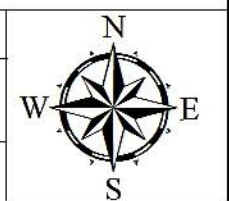
Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

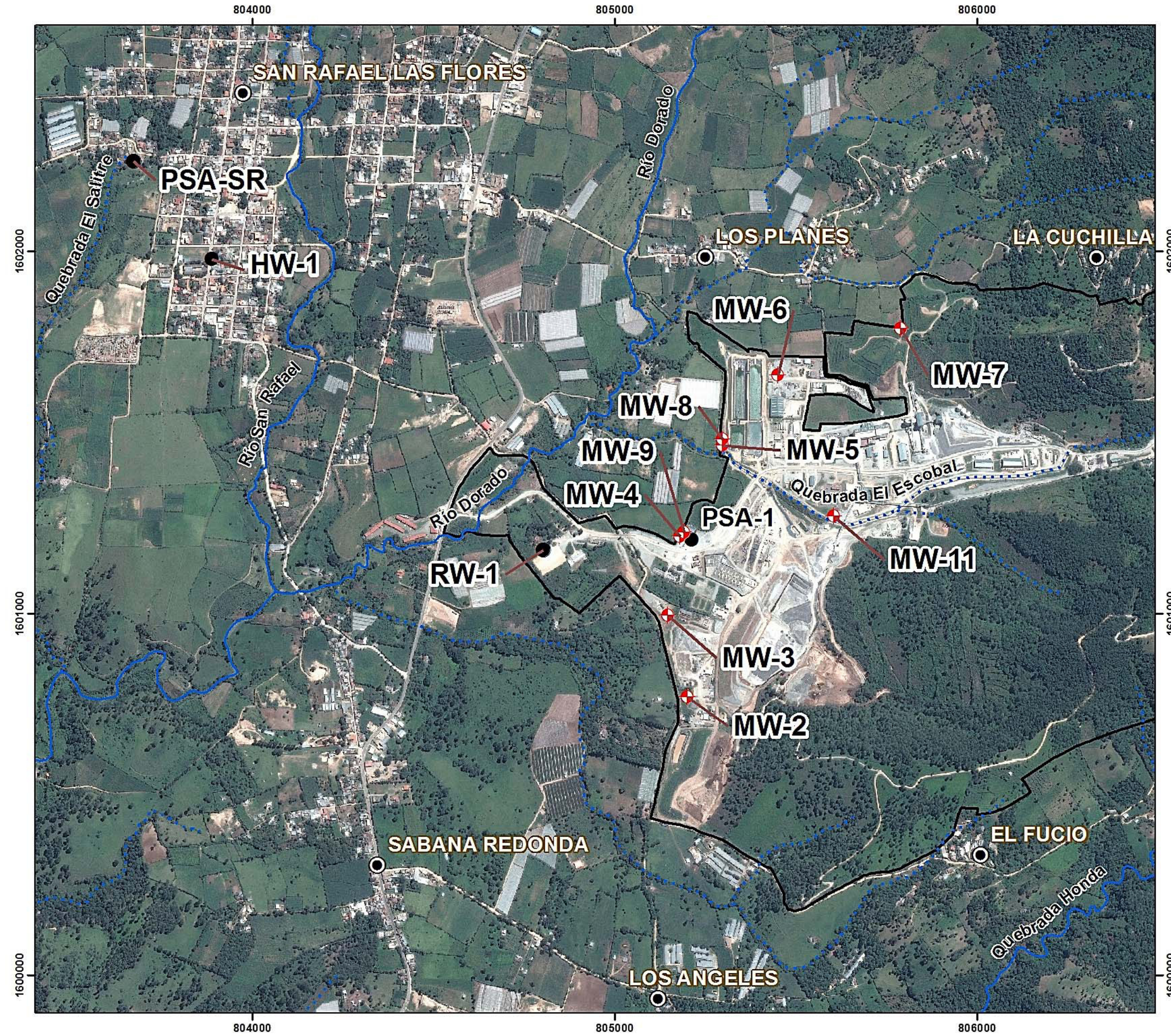
ESTACIONES DE MONITOREO (POZOS)

Símbolo	Estación	X	Y
	GW-1A	808664	1599957
	GW-2	807509	1601262
	GW-3	806187	1601397
	GW-4	805986	1600736
	GW-5	805858	1600731

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas catográficas año 2010 M ataquescuintia (2159-1) y Laguna de Ayarza (2159-11) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014,
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016
Distancia Horizontal y Vertical de Grilla: 1,000 metros
Escala 1:16,000





MAPA DE LOCALIZACIÓN ESTACIONES (POZOS) DE MONITOREO Y REFERENCIA

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



DEPARTAMENTO DE AMBIENTE
Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO (POZOS)

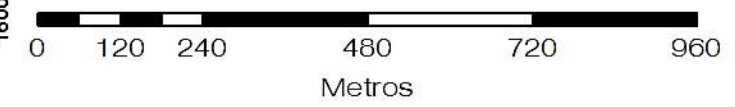
Símbolo	Estación	X	Y	
	MW-2	805201	1600768	
	MW-3	805148	1600993	
	MW-4	805181	1601212	
	MW-5	805299	1601463	
	MW-6	805452	1601657	
	MW-7	805791	1601785	
	MW-8	805298	1601480	
	MW-9	805192	1601222	
	MW-11	805607	1601267	
		RW-1	804803	1601175
		PSA-SR	803672	1602247
HW-1		803888	1601977	
PSA-1		805212	1601203	

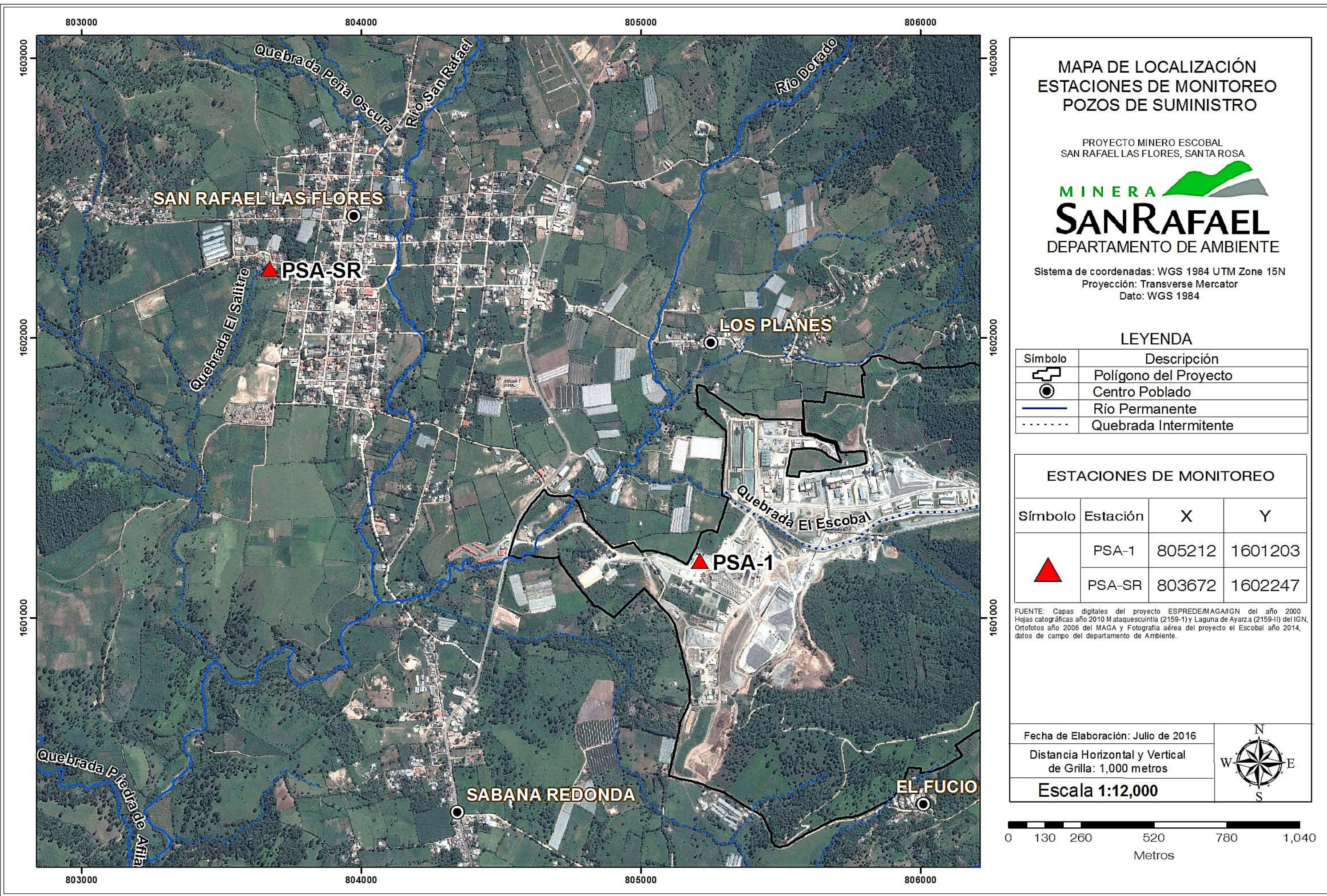
FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas cartográficas año 2010 Mataquesuinta (2159-1) y Laguna de Ayarza (2159-II) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014,
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016

Distancia Horizontal y Vertical
de Grilla: 1,000 metros

Escala 1:11,000





MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO POZOS DE SUMINISTRO

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO

Símbolo	Estación	X	Y
	PSA-1	805212	1601203
	PSA-SR	803672	1602247

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 Mataquesuintla (2159-I) y Laguna de Ayarza (2159-II) del IGN, Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014, datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:12,000



4.2 Metodología

En el Cuadro 4-2 se describe el procedimiento y equipo utilizado para la toma de muestras de agua.

Cuadro 4-2: Procedimiento y equipo utilizado para medir parámetros *in situ* de muestras de agua, Proyecto Minero Escobal

Parámetros analizados	
<i>In Situ</i>	pH, conductividad eléctrica, oxígeno disuelto, temperatura y sólidos disueltos totales.
Laboratorio	Laboratorio ACZ: Aceites y Grasas, Hidrocarburos Totales de Petróleo, Metales Totales (solo en agua superficial); Metales Disuelto, Cationes, Aniones y demás parámetros fisicoquímicos. Laboratorio Ecosistemas: DBO, coniformes totales, color, Cromo hexavalente.
Procedimiento	
Basado en el procedimiento de toma de muestra dado por Water Management Consultants y el laboratorio ACZ para las muestras del perfil de agua superficial (SW) y agua subterránea (GW). Y en el procedimiento dado por <i>Standard Methods for the Examination of Water and Wastewater, part 1060 B</i> para las muestras de agua residual.	
Equipo utilizado	
Nombre	Multiparámetros
Modelo	PCD650
Fabricante	OAKTON

Fuente: MSR, 2016.

Laboratorio empleado y valores de referencia: Las muestras fueron analizadas en el laboratorio ACZ, 2773 Downhill Drive Steamboat Springs, Colorado USA, el cual se encuentra acreditado y avalado por la USEPA. Los análisis de color, DBO, coliformes fecales y cromo hexavalente fueron analizados en el laboratorio Ecosistemas Proyectos Ambientales, S.A., laboratorio respaldado por un Sistema de Calidad ISO 17025, otorgado por la Oficina Guatemalteca de Acreditación (OGA); y con ello los análisis acreditados cuentan con validez internacional según OGA-LE 006-04.

4.3 Resultados

4.3.1 Control de Calidad

En el monitoreo correspondiente al mes de Junio se emplearon muestras control para determinar la confiabilidad de los parámetros analizados por el laboratorio encargado del análisis de muestras. En total se efectuaron 3 muestras blanco y tres muestras duplicado. Los resultados obtenidos se presentan en el Cuadro 4-3.

En las tres muestras del control de calidad de los blancos de campo, se detectaron concentraciones mínimas de boro disuelto (MW20), níquel disuelto (SW10), zinc disuelto (SW10), cloruros (GW10), nitrógeno kjeldahl (SW10 y MW20), sólidos disueltos totales (MW20) e hidrocarburos totales (SW10). Sin embargo las concentraciones detectadas están muy cerca a los límites de detección del método, por lo que se considera que no hay un aporte significativo de estos elementos en los resultados obtenidos. Todos los demás parámetros analizados por el laboratorio son confiables tanto en manipulación de las muestras como en precisión del análisis.

Cuadro 4-3: Resultados de control de calidad, blanco y duplicado, para análisis de agua superficial y subterránea

Parámetros	Unidad	Blancos de campo			Muestras duplicado					
		Agua EMSURE (metales) y agua desmineralizada (Fisicoquímicos)			Duplicado	Original	Duplicado	Original	Duplicado	Original
		SW10	GW10	MW20	SW11	SW2A	GW11	GW3	MW21	MW9
Cr VI	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DBO	mg/L	<10	N/A	N/A	<10	<10	N/A	N/A	N/A	N/A
Coliformes Fecales	NMP/100 ml	<2	<2	<2	490	1.7 x 10 ³	0.23	<2	<2	<2
Color Real	U Pt/Co	<1	<1	<1	<1	<1	<1	<1	<1	<1
Materia flotante	U Pt/Co					Ausente		Ausente		Ausente
Aluminio Disuelto	mg/L	<0.03	<0.03	<0.03	0.09	0.08	<0.03	<0.03	<0.03	<0.03
Aluminio Total		<0.03	NA	NA	0.05	0.05	NA	NA	NA	NA
Antimonio Disuelto		<0.0004	<0.0004	<0.0004	0.011	0.0111	0.0005	0.0005	<0.0004	<0.0004
Antimonio Total		<0.0004	NA	NA	0.0103	0.0101	NA			
Arsénico Disuelto		<0.0002	<0.0002	<0.0002	0.0088	0.009	0.0026	0.0025	0.0025	0.0017
Arsénico Total		<0.0002	NA	NA	0.0092	0.0095	NA			
Bario Disuelto		<0.003	<0.003	<0.003	0.104	0.105	0.128	0.127	0.024	0.057
Bario Total		<0.003	NA	NA	0.108	0.109	NA			
Berilio Disuelto		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Berilio Total		<0.01	NA	NA	<0.01	<0.01	NA			
Bismuto Disuelto		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Bismuto Total		<0.04	NA	NA	<0.04	<0.04	NA			
Boro Disuelto		<0.01	<0.01	0.01	0.09	0.09	0.01	0.02	0.06	0.03
Boro Total		<0.01	NA	NA	0.12	0.12	NA			
Cadmio Disuelto		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmio Total		<0.0001	NA	NA	<0.0001	<0.0001	NA			
Calcio Disuelto		<0.1	<0.1	<0.1	311	311	84.8	83.9	69	43.6
Calcio Total		<0.1	NA	NA	319	324	NA			
Cromo Disuelto		<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01
Cromo Total		<0.01	NA	NA	<0.01	<0.01	NA			
Cobalto Disuelto		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalto Total		<0.01	NA	NA	<0.01	<0.01	NA			
Cobre Disuelto		<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Cobre Total		<0.01	NA	NA	<0.01	<0.01	NA			
Galio Disuelto		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Galio Total		<0.1	NA	NA	<0.1	<0.1	NA			
Hierro Disuelto		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	6.06
Hierro Total		<0.02	NA	NA	<0.02	<0.02	NA			
Plomo Disuelto		<0.0001	<0.0001	<0.0001	0.0004	0.0004	<0.0001	<0.0001	<0.0001	<0.0001
Plomo Total		<0.0001	NA	NA	0.0007	0.0011	NA			

Parámetros	Unidad	Blancos de campo			Muestras duplicado					
		Agua EMSURE (metales) y agua desmineralizada (Fisicoquímicos)			Duplicado	Original	Duplicado	Original	Duplicado	Original
		SW10	GW10	MW20	SW11	SW2A	GW11	GW3	MW21	MW9
Litio Disuelto	mg/L	<0.008	<0.008	<0.008	0.075	0.075	<0.008	<0.008	0.014	0.010
Litio Total		<0.008	NA	NA	0.066	0.067	NA			
Magnesio Disuelto		<0.2	<0.2	<0.2	17.1	17.1	17.7	17.6	7.5	7.5
Magnesio Total		<0.2	NA	NA	17.7	17.8	NA			
Manganeso Disuelto		<0.005	<0.005	<0.005	0.181	0.179	<0.005	<0.005	<0.005	0.069
Manganeso Total		<0.005	NA	NA	0.183	0.191	NA			
Mercurio Disuelto		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Mercurio Total		<0.0002	NA	NA	<0.0002	<0.0002	NA			
Molibdeno Disuelto		<0.02	<0.02	<0.02	0.06	0.05	<0.02	<0.02	<0.02	<0.02
Molibdeno Total		<0.02	NA	NA	0.05	0.04	NA			
Níquel Disuelto		0.01	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
Níquel Total		<0.008	NA	NA	<0.008	<0.008	NA			
Potasio Disuelto		<0.2	<0.2	<0.2	11.7	11.8	9.2	9.2	3.8	4.3
Potasio Total		<0.2	NA	NA	12.1	12.1	NA			
Escandio Disuelto		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Escandio Total		<0.1	NA	NA	<0.1	<0.1	NA			
Selenio Disuelto		<0.0001	<0.0001	<0.0001	0.0008	0.0009	0.0005	0.0005	0.0003	<0.0001
Selenio Total		<0.0001	NA	NA	0.0009	0.0009	NA			
Plata Disuelta		<0.00005	<5x10 ⁻⁵	<5x10 ⁻⁵	<0.00005	<0.00005	<5x10 ⁻⁵	<5x10 ⁻⁵	<5x10 ⁻⁵	<5x10 ⁻⁵
Plata Total		<0.00005	NA	NA	<0.00005	<0.00005	NA			
Sodio Disuelto		<0.2	<0.2	<0.2	72.3	71.9	21.3	21.2	24.7	26
Sodio Total		<0.2	NA	NA	74.5	75.1	NA			
Estroncio Disuelto		<0.005	<0.005	<0.005	3.24	3.23	0.415	0.410	0.615	0.300
Estroncio Total		<0.005	NA	NA	3.28	3.31	NA			
Talio Disuelto		<0.0001	<0.0001	<0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Talio Total		<0.0001	NA	NA	0.0002	0.0002	NA			
Estaño Disuelto		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Estaño Total		<0.04	NA	NA	<0.04	<0.04	NA			
Titanio Disuelto		<0.005	<0.005	<0.005	0.013	0.013	0.007	0.008	0.006	<0.005
Titanio Total		<0.005	NA	NA	0.016	0.017	NA			
Uranio Disuelto		<0.0001	<0.0001	<0.0001	0.0005	0.0005	0.0001	<0.0001	0.0001	<0.0001
Uranio Total		<0.0001	NA	NA	0.0006	0.0006	NA			
Vanadio Disuelto		<0.005	<0.005	<0.005	0.011	0.011	<0.005	<0.005	0.005	<0.005
Vanadio Total		<0.005	NA	NA	<0.005	0.007	NA			
Zinc Disuelto		0.02	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	0.02
Zinc Total		<0.01	NA		<0.01	<0.01	NA			
Grasas y Aceites		<2	NA		2.9	4.8	NA			
DQO		<10	NA		<10	<10	NA			
Cloruros		<0.5	0.7	<0.5	66.9	67	16.8	17.2	13.2	7.6
Cianuro Total		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Fluoruros	<0.05	<0.05	<0.05	1.17	1.17	0.18	0.18	0.85	0.50	
Nitratos/Nitritos como N	<0.02	<0.02	<0.02	2.38	2.38	3.49	3.51	2.62	0.03	
Amonio	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Nitrógeno Kjeldahl (TKN)	0.1	<0.1	0.2	0.5	0.4	0.2	0.2	<0.1	0.1	
Fosfatos	<0.06	<0.06	<0.06	0.09	0.09	<0.06	<0.06	0.22	0.47	
Fósforo Disuelto (Orto)	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.03	0.1	0.03	
Fósforo Total	<0.02	<0.02	<0.02	0.03	0.03	<0.02	<0.02	0.07	0.16	
STD (TDS)	<10	<10	10	1480	1500	530	532	434	320	
SST (TSS)	<5	<5	<5	<5	<5	<5	<5	<5	<5	
ST (TS)	<10	<10	<10	1520	1520	544	546	440	320	

Parámetros	Unidad	Blancos de campo			Muestras duplicado					
		Agua EMSURE (metales) y agua desmineralizada (Fisicoquímicos)			Duplicado	Original	Duplicado	Original	Duplicado	Original
		SW10	GW10	MW20	SW11	SW2A	GW11	GW3	MW21	MW9
Sulfatos	mg/L	<1	<1	<1	860	860	220	221	146	69.7
Alcalinidad Total		<2	<2	<2	68.3	68.1	95.7	113	79.8	110
Hidrocarburos totales (TPH)		0.2	NA		0.1	<0.1	NA			

u.e.: unidades exponenciales. mg/L: miligramos por litro. NMP/100ml: número más probable en 100ml. u Pt/Co: unidades platino cobalto. Fuente: MSR, 2016.

4.3.2 Agua Superficial

En el Cuadro 4-4 se presentan los resultados de la calidad del agua superficial para el mes de Junio en las once estaciones de monitoreo y un resumen estadístico (promedio, valor máximo y valor mínimo) de la línea base establecida para cada estación. Los resultados del laboratorio se presentan en el anexo 11.5.1.

Según los parámetros fisicoquímicos analizados, todas las estaciones monitoreadas cumplen con los valores máximos permisibles dados por el Acuerdo Gubernativo 236-2006 para entes generadores nuevos.

Las estaciones muestreadas presentaron un pH levemente alcalino (7.36 a 8.40 u.e.). En ninguna de las estaciones se detectaron valores de grasas y aceites, a excepción de la estación SW2A-E y SW8-E. En ninguna estación se registró cianuro total cumpliendo con las guías establecidas por la USEPA para la salud humana, el Banco Mundial y el Acuerdo Gubernativo 236-2006 (**Acuerdo**) para aguas residuales. La Demanda Química de Oxígeno (**DQO**) se detectó en las estaciones SW1-E, SW3-E, SW4-E, SW7-E, SW8-E y SW9-E sin que sobrepasar el valor guía establecido por el Banco Mundial (125 mg/L). En ninguna estación se detectó concentración alguna de Demanda Bioquímica de Oxígeno (**DBO**), a excepción de la estación SW8-E.

Las estaciones muestreadas presentaron concentraciones por debajo de la directriz de la USEPA para la salud humana de Cloruros (250 mg/L), Fluoruros (4 mg/L) y concentraciones por debajo de los valores establecidos por el Acuerdo (10 mg/L) y el Banco Mundial (2 mg/L) para Fósforo total.

En ocho de las once estaciones se detectó sólidos suspendidos totales encontrándose por debajo de los valores establecidos por el Acuerdo (100 mg/L), por el Banco Mundial (50 mg/L) y dentro de los valores establecidos durante el levantamiento de línea base.

Los Sulfatos Totales y los Sólidos Disueltos Totales (**TDS**) fueron detectados en la mayoría de las estaciones en concentraciones por debajo de los valores máximos establecidos durante la línea base, a excepción de la estación SW4-E para sulfatos.

La estación SW2A no cuenta con línea base pero se utiliza los valores registrados en la línea base de la estación SW2 como referencia para analizar su comportamiento, ya que las dos estaciones están ubicadas en la quebrada El Escobal aguas abajo y están separadas a escasos 400mts aproximadamente. El Aluminio fue detectado en todas las estaciones en diferentes concentraciones. Sin embargo los datos se encuentran dentro de los límites establecidos durante el levantamiento de la línea base. El Antimonio fue detectado en ocho estaciones, por debajo de los límites máximos establecidos durante la línea base.

Las concentraciones de Arsénico Total se encuentran por debajo de los límites establecidos por el Acuerdo (0.1 mg/L) y respecto de las directrices de la USEPA (0.01mg/L) todas las estaciones se encontraron por debajo del valor guía. En ninguna estación de monitoreo de agua superficial fue detectado Mercurio. Y en todas las estaciones fue detectado el Plomo Total, a excepción de la estación SW-E, registrándose todas las concentraciones por debajo de los valores guía sugeridos por la USEPA (0.015 mg/L) y el Acuerdo (0.4 mg/L).

Cuadro 4-4: Resultados de la Calidad del Agua Superficial, Proyecto Minero Escobal (1/4)

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW1-E				SW2-E				SW2A-E			
					Quebrada Escobal-aguas arriba				Quebrada Escobal-en medio del Proyecto				Quebrada Escobal- salida del Proyecto			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	7.509	7.14	8.06	8.19	7.42	6.56	7.87	8.40				8.17
Temperatura (campo)	°C				17.4	13	19.8	18.1	22.4	20.3	25.6	23.6				25.4
Conductividad (campo)	µS/cm				277.9	66.3	566.6	192.6	807.3	177.3	1965	1212				1423
Oxígeno disuelto (campo)					3.6	0.1	6.4	7.83	4.76	3.5	5.8	7.27				7.78
Cr VI	mg/L							<0.05				<0.05				<0.05
DBO								<10				<10				<10
Coliformes Fecales	NMP/100ml							9.2x10 ³				1.6x10 ³				1.7x10 ³
Color Real	U Pt/Co				NR	NR	NR	15	NR	NR	NR	<1				<1
Materia Flotante								Ausente				Ausente				Ausente
Turbidez	NTU							25.5				4.20				1.07
Aluminio Disuelto					0.035	<0.03	0.09	0.04	0.043	<0.03	0.12	0.06				0.08
Aluminio Total		0.2			5.02	<0.03	35.1	1.48	2.35	0.06	8.77	0.22				0.05
Antimonio Disuelto					<0.0004	<0.0004	0.0006	<0.0004	<0.0004	<0.0004	<0.0004	0.009				0.0111
Antimonio Total		0.006			<0.0004	<0.0004	0.0007	<0.0004	<0.0004	<0.0004	0.0005	0.0086				0.0101
Arsénico Disuelto					0.00216	0.0005	0.0034	0.0014	0.00184	0.0013	0.0024	0.0085				0.009
Arsénico Total		0.01		0.1	0.00339	0.0015	0.0094	0.0019	0.00266	0.0012	0.0054	0.0084				0.0095
Bario Disuelto					0.1361	0.086	0.207	0.101	0.109	0.088	0.133	0.114				0.105
Bario Total		1			0.186	0.1	0.434	0.11	0.131	0.096	0.186	0.111				0.109
Berilio Disuelto					<0.002	<0.002	<0.01	<0.01	<0.002	<0.002	<0.002	<0.01				<0.01
Berilio Total		0.004			<0.002	<0.002	<0.01	<0.01	<0.002	<0.002	<0.002	<0.01				<0.01
Bismuto Disuelto					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	<0.04				<0.04
Bismuto Total					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.08	<0.04				<0.04
Boro Disuelto					<0.01	<0.01	<0.01	0.02	0.114	<0.01	0.29	0.1				0.09
Boro Total					<0.01	<0.01	0.02	<0.01	0.11	<0.01	0.28	0.08				0.12
Cadmio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	NR	NR	NR	<0.0001
Cadmio Total		0.003		0.1	<0.0001	<0.0001	0.0007	<0.0001	<0.0001	<0.0001	0.0001	<0.0001				<0.0001
Calcio Disuelto					45.2	18.9	74.5	29.3	144.9	20.7	333	263				311
Calcio Total					45.5	20.9	70.5	28.3	144.6	20.5	331	259				324
Cromo Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.02
Cromo Total		0.1		0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Cobalto Disuelto					<0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01				<0.01
Cobalto Total					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Cobre Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.01
Cobre Total		1.3		3	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01				<0.01
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1
Galio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1
Hierro Disuelto					<0.02	<0.02	0.04	<0.02	0.04	<0.02	0.12	<0.02				<0.02
Hierro Total		0.3			2.7	<0.02	19.5	0.66	1.3	0.06	5.19	0.07				<0.02
Plomo Disuelto					<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	0.0001	0.0005				0.0004
Plomo Total		0.015		0.4	0.0025	<0.0001	0.0191	0.0007	0.00088	<0.0001	0.0038	0.0018				0.0011
Litio Disuelto					<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	0.056				0.075
Litio Total					<0.02	<0.02	<0.02	<0.008	0.02	<0.02	0.02	0.055				0.067
Magnesio Disuelto					3.9	2.6	5.3	3.7	15.9	3.2	37.3	16				17.1
Magnesio Total					4.2	2.8	5.2	3.6	15.1	3.6	32.2	15.6				17.8
Manganeso Disuelto					0.0051	<0.005	0.02	<0.005	0.0195	<0.005	0.07	0.161				0.179
Manganeso Total		0.4			0.1041	<0.005	0.721	0.03	0.0602	0.007	0.174	0.162				0.191
Mercurio Disuelto					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				<0.0002
Mercurio Total		0.002		0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				<0.0002
Molibdeno Disuelto					<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	0.02				0.05

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW1-E				SW2-E				SW2A-E				
					Quebrada Escobal-aguas arriba				Quebrada Escobal-en medio del Proyecto				Quebrada Escobal- salida del Proyecto				
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
Molibdeno Total					<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	0.02				0.04	
Níquel Disuelto					<0.01	<0.01	0.03	<0.008	0.013	<0.01	0.04	<0.008				<0.008	
Níquel Total		0.61		2	<0.01	<0.01	0.04	<0.008	0.022	<0.01	0.04	<0.008				<0.008	
Potasio Disuelto					4.4	3.5	5.1	5.1	6.1	4.9	7.6	9.9				11.8	
Potasio Total					5.3	3.5	13	5.1	6.3	5.2	7.4	9.7				12.1	
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	
Escandio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	
Selenio Disuelto					<0.0001	<0.0001	0.0001	<0.0001	0.00045	<0.0001	0.0002	0.0007				0.0009	
Selenio Total		0.17			0.0001	<0.0001	0.0003	<0.0001	0.00011	<0.0001	0.0002	0.0008				0.0009	
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005				<0.00005	
Plata Total					<0.00005	<0.00005	0.00015	<0.00005	<0.00005	<0.00005	0.00006	<0.00005				<0.00005	
Sodio Disuelto					9.81	8.3	11.6	8.4	40.1	9.4	87.8	61				71.9	
Sodio Total					9.46	7.8	11.8	7.8	39.8	9.4	85.2	58.4				75.1	
Estroncio Disuelto					0.17	0.09	0.26	0.142	1.23	0.1	2.99	2.64				3.23	
Estroncio Total					0.18	0.1	0.25	0.136	1.23	0.11	2.91	2.6				3.31	
Talio Disuelto					<0.0001	<0.0001	0.0002	<0.0001	0.0001	<0.0001	0.0001	0.0001				0.0002	
Talio Total		0.002			<0.0001	<0.0001	0.0004	<0.0001	0.0001	<0.0001	0.0002	0.0001				0.0002	
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04				<0.04	
Estaño Total					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04				<0.04	
Titanio Disuelto					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.013				0.013	
Titanio Total					0.092	<0.005	0.591	0.042	0.2715	<0.005	0.171	0.014				0.017	
Uranio Disuelto					0.00013	<0.0001	0.0003	<0.0001	0.00028	<0.0001	0.0006	0.0003		NR	NR	NR	0.0005
Uranio Total	mg/L				0.00038	<0.0001	0.0011	<0.0001	0.00024	<0.0001	0.0005	0.0004				0.0006	
Vanadio Disuelto					<0.005	<0.005	0.007	<0.005	0.0065	<0.005	0.015	<0.005				0.011	
Vanadio Total					0.0059	<0.005	0.024	<0.005	<0.005	<0.005	0.006	0.005				0.007	
Zinc Disuelto					0.053	<0.01	0.1	<0.01	0.046	<0.02	0.1	<0.01				0.02	
Zinc Total		7.4		10	0.064	<0.01	0.12	<0.01	0.041	<0.01	0.06	<0.01				<0.01	
Grasas y Aceites			10	10	<2.062	<2.062	<2.248	<2.2	<2.04	<2.04	<2.04	<2.2				4.8	
DQO			125		15.7	<10	40	13	<2.04	<2.04	<2.04	<10				<10	
Cloruros		250			5	4	7	7.7	<2.04	<2.04	<2.04	55.9				67	
Cianuro Total		0.14		1	0.004	<0.003	0.015	<0.0003	<0.003	<0.003	<0.003	<0.003				<0.003	
Fluoruros		4			0.125	<0.1	0.2	0.13	0.6	0.1	1.2	0.93				1.17	
Nitratos/Nitritos como N					1.61	0.08	4.87	5.9	2.46	0.03	4.9	3.44				2.38	
Amonio					<0.005	<0.005	0.07	<0.05	<0.05	<0.05	0.07	<0.05				<0.05	
Nitrógeno Kjeldahl (TKN)					3.53	<0.1	25.9	0.8	0.32	<0.1	0.8	0.9				0.4	
Fosfatos					0.185	0.1	0.3	0.19	0.19	0.1	0.4	0.09				0.09	
Fósforo Disuelto (Orto)					0.06	0.03	0.1	0.06	0.06	0.02	0.13	0.03				<0.02	
Fósforo Total			2	10	0.37	0.04	2.51	0.08	0.08	0.03	0.19	0.04				0.03	
STD (TDS)		500			225	170	280	216	754	170	1620	1240				1500	
SST (TSS)			50	100	163.6	<5	780	13	67	<5	320	<5				<5	
ST (TS)					346.3	200	1080	224	850	230	1660	1240				1520	
Sulfatos		250			26.3	10	42	28.1	472.6	14	1600	685				860	
Alcalinidad Total					104	38	161	54.3	80	44	119	88.7				68.1	
Hidrocarburos totales (TPH)					<0.1	<0.09	<0.1	<0.1	<0.1	<0.09	<0.1	<0.1				<0.1	

Dónde: **u.e.:** unidades exponenciales; **mg/L:** miligramos por litro; **µS/cm:** micro siemens por centímetro; **°C:** grados centígrados; **NMP/100ml:** número más probable en 100ml; **u Pt/Co:** unidades platino cobalto; **NR** = Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

Cuadro 4-4: Resultados de la Calidad del Agua Superficial, Proyecto Minero Escobal (2/4)

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW3-E				SW4-E				SW4A-E			
					Río El Dorado – Aguas arriba				Río El Dorado – sobre camino vecinal				Río El Dorado – Aguas abajo			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	7.58	7.17	8.17	7.94	7.4	6.56	7.94	7.36				7.84
Temperatura (campo)	°C				19.8	17	24	19.8	21	17.2	24	14.9				21.8
Conductividad (campo)	µS/cm				219.7	80	374.5	189.7	308.9	120	612	554.4				786.0
Oxígeno disuelto (campo)					3.8	0.1	6.8	7.73	4.2	0.1	7.5	7.47				7.24
Cr VI	mg/L							<0.05				<0.05				<0.05
DBO								<10				<10				<10
Coliformes Fecales	NMP/100ml							9.2 x 10 ³				5.4x10 ⁵				2.2x10 ⁵
Color Real	U Pt/Co				NR	NR	NR	20	NR	NR	NR	<1				<1
Materia Flotante								Presente				Ausente				Ausente
Turbidez	NTU							19.80				59.7				17.8
Aluminio Disuelto					0.061	<0.03	0.15	0.09	0.03	<0.03	0.1	0.13				0.07
Aluminio Total		0.2			3.25	<0.03	17.4	2.81	5.72	0.1	36	4.69				1.76
Antimonio Disuelto					<0.0004	<0.0004	<0.0004	0.0006	0.0007	0	0.0011	0.0025				0.0039
Antimonio Total		0.006			<0.0004	<0.0004	<0.0004	0.0005	0.0012	0.0005	0.0037	0.0022				0.0038
Arsénico Disuelto					0.00797	0.0041	0.0139	0.0092	0.00541	0.0039	0.0072	0.0071				0.0074
Arsénico Total		0.01		0.1	0.00888	0.006	0.0137	0.0104	0.00873	0.0043	0.0326	0.0096				0.009
Bario Disuelto					0.0915	0.051	0.118	0.112	0.1645	0.08	0.234	0.132				0.151
Bario Total		1			0.12445455	0.098	0.253	0.14	0.2356	0.144	0.567	0.158				0.167
Berilio Disuelto					<0.002	<0.0002	<0.01	<0.01	<0.002	<0.002	<0.01	<0.01				0.01
Berilio Total		0.004			<0.002	<0.0002	<0.01	<0.01	0.002	<0.002	0.003	<0.01				<0.01
Bismuto Disuelto					<0.01	<0.01	<0.04	<0.04	0.04	<0.04	0.1	0.04				<0.04
Bismuto Total					<0.01	<0.01	<0.04	<0.04	0.04	<0.04	0.04	<0.04				<0.04
Boro Disuelto					<0.01	<0.01	0.02	<0.01	0.008	<0.01	0.02	0.04				0.03
Boro Total					<0.01	<0.01	0.02	0.01	0.012	<0.01	0.02	0.02				0.06
Cadmio Disuelto					<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	NR	NR	NR	<0.0001
Cadmio Total		0.003		0.1	<0.0001	<0.0001	0.0002	<0.0001	0.00012	<0.0001	0.0005	0.0001				<0.0001
Calcio Disuelto					27.8	11.7	39.9	29	37.4	18.5	61.7	98.9				151
Calcio Total					27.9272727	12.3	38.7	30.5	38.3	17.2	58.9	92.2				155
Cromo Disuelto					<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01				0.01
Cromo Total		0.1		0.1	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01				<0.01
Cobalto Disuelto					0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01				<0.01
Cobalto Total					0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01				<0.01
Cobre Disuelto					<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.01
Cobre Total		1.3		3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01				<0.01
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1
Galio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1
Hierro Disuelto					0.033	<0.02	0.06	<0.02	0.032	<0.02	0.15	0.07				<0.02
Hierro Total		0.3			1.9	0.06	10.2	1.19	3.8	0.09	26.5	2				0.97
Plomo Disuelto					<0.0001	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	0.0002	0.0002				0.0001
Plomo Total		0.015		0.4	0.0013	<0.0001	0.0072	0.001	0.003	<0.0001	0.0198	0.0031				0.0028
Litio Disuelto					<0.02	<0.02	<0.02	0.012	<0.02	<0.02	<0.02	0.012				0.034
Litio Total					<0.02	<0.02	<0.02	<0.008	0.02	<0.02	0.02	0.013				0.025
Magnesio Disuelto					2.6	1.3	3.5	2.6	4.2	2.4	7.3	7.7				10.1
Magnesio Total					2.7	1.6	3.5	2.8	4.6	2.5	7.3	7.3				10.4
Manganeso Disuelto					0.07418182	0.01	0.381	0.091	0.116	0.011	0.26	0.205				0.404
Manganeso Total		0.4			0.14745455	0.025	0.403	0.13	0.2844	0.101	1.23	0.262				0.447
Mercurio Disuelto					<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				<0.0002
Mercurio Total		0.002		0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				<0.0002
Molibdeno Disuelto					0.01	<0.01	0.01	<0.02	<0.01	<0.01	<0.01	<0.02				<0.02

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW3-E				SW4-E				SW4A-E				
					Río El Dorado – Aguas arriba				Río El Dorado – sobre camino vecinal				Río El Dorado – Aguas abajo				
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
Molibdeno Total	mg/L				0.01	<0.01	0.01	<0.02	<0.01	<0.01	<0.01	<0.02				<0.02	
Níquel Disuelto					<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	0.02	<0.008				<0.008	
Níquel Total		0.61		2	<0.01	<0.01	0.05	<0.008	0.01	<0.01	0.06	<0.008				<0.008	
Potasio Disuelto					4.2	3.5	5.5	5	5.8	4.2	8.7	7.5				8.9	
Potasio Total					4.5	3.6	7	5.4	6.5	4.4	11.7	7.7				9.2	
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	
Escandio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	
Selenio Disuelto					<0.0001	<0.0001	0.0001	<0.0001	0.00014	<0.0001	0.0005	0.0002				0.0004	
Selenio Total		0.17			<0.0001	<0.0001	0.0001	<0.0001	0.0002	<0.0001	0.0002	0.0002				0.0004	
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005				<0.00005	
Plata Total					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00011	<0.00005				0.00006	
Sodio Disuelto					12.65	7.7	16.6	10.5	12.44	9	15.6	24.8				36.4	
Sodio Total					12.17	7.5	15.4	11	12.13	8.6	15.2	22.4				37.4	
Estroncio Disuelto					0.19	0.06	0.3	0.2	0.22	0.09	0.36	0.791				1.43	
Estroncio Total					0.18818182	0.08	0.3	0.2	0.228	0.11	0.33	0.74				1.4	
Talio Disuelto					<0.0001	<0.0001	0.0005	<0.0001	0.0001	<0.0001	0.0001	<0.0001				<0.0001	
Talio Total		0.002			<0.0001	<0.0001	0.0002	<0.0001	0.00017	<0.0001	0.0007	0.0001				0.0001	
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04				<0.04	
Estaño Total					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04				<0.04	
Titanio Disuelto					<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.011				0.013	
Titanio Total					0.071	<0.005	0.307	0.071	0.127	0.005	0.534	0.111				0.062	
Uranio Disuelto					<0.0001	<0.0001	0.0002	0.0002	0.00012	<0.0001	0.0004	0.0003		NR	NR	NR	0.0003
Uranio Total					0.00019	<0.0001	0.0005	0.0003	0.00027	<0.0001	0.0009	0.0004				0.0004	
Vanadio Disuelto					<0.005	<0.005	0.008	0.007	<0.005	<0.005	0.011	<0.005				0.009	
Vanadio Total					0.0051	<0.005	0.019	<0.005	0.0085	<0.005	0.04	0.005				<0.005	
Zinc Disuelto					0.068	<0.01	0.14	<0.01	0.061	0.05	0.14	<0.01				0.01	
Zinc Total		7.4		10	0.174	<0.01	1.01	<0.01	0.065	0.01	0.17	0.01				<0.01	
Grasas y Aceites				10	<2.062	<2.04	<2.326	<2.2	<2.062	<2.02	<2.084	<2.2				<2.2	
DQO			125		10.9	<10	40	14	16.8	<10	60	27				<10	
Cloruros		250			2.7	2	3	4.1	8.5	4	16	22.2				33.7	
Cianuro Total		0.14		1	<0.003	<0.003	0.015	<0.003	<0.003	<0.003	0.014	<0.003				<0.003	
Fluoruros		4			<0.003	<0.003	0.015	0.18	0.15	0.1	0.2	0.35				0.52	
Nitratos/Nitritos como N					0.59	<0.02	1.51	0.85	4.49	1.96	10.1	2.12				1.98	
Amonio					0.05	<0.05	0.21	<0.05	0.059	<0.05	0.15	0.14				0.13	
Nitrógeno Kjeldahl (TKN)					0.35	<0.1	0.6	0.5	0.58	0.1	1.3	1.3				0.9	
Fosfatos					0.12	0.1	0.4	0.19	0.36	0.1	1.2	0.31				0.25	
Fósforo Disuelto (Orto)					0.04	0.02	0.12	0.04	0.12	0.03	0.39	0.08				0.07	
Fósforo Total			2	10	0.05	0.02	0.14	0.08	0.17	0.04	0.39	0.16				0.1	
STD (TDS)		500			183.636364	140	220	204	233.6	150	350	490				756	
SST (TSS)			50	100	48	5	340	18	115	<5	880	82				40	
ST (TS)				231.8	140	500	222	378.2	260	1180	568				804		
Sulfatos	250			16.9	4	25	24.2	27.5	10	57	221				380		
Alcalinidad Total				83	38	118	82.5	80	45	102	77.3				82.2		
Hidrocarburos totales (TPH)				<0.1	<0.09	<0.2	<0.1	<0.1	<0.09	<0.1	<0.1				<0.1		

Dónde: **u.e.:** unidades exponenciales; **mg/L:** miligramos por litro; **µS/cm:** micro siemens por centímetro; **°C:** grados centígrados; **NMP/100ml:** número más probable en 100ml; **u Pt/Co:** unidades platino cobalto; **NR =** Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

Cuadro 4-4: Resultados de la Calidad del Agua Superficial, Proyecto Minero Escobal (3/4)

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW5-E				SW6-E				SW7-E			
					Río Tapalapa – Aguas arriba				Río Los Vados				Quebrada La Honda			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	7.5	7.1	8	7.70	7.4	7.1	7.8	7.61	7.5	6.9	8	7.55
Temperatura (campo)	°C				17.4	14.5	21.5	17.0	19.4	12.2	27.3	17.9	18.7	15	21.3	18.4
Conductividad (campo)	µS/cm				72.1	0.1	160.2	501.3	259	60	948	95.35	216	120	416.2	146.0
Oxígeno disuelto (campo)	mg/L				4	0	8	7.47	4	0	8.3	8.07	3.9	0.1	7.5	7.68
Cr VI								<0.05				<0.05				<0.05
DBO								<10				<10				<10
Coliformes Fecales	NMP/100ml				NR	NR	NR	1.6x10 ⁴	NR	NR	NR	2.3 x 10 ³	NR	NR	NR	3.5 x 10 ³
Color Real	U Pt/Co							<1				42				49
Materia Flotante								NA				Ausente				Ausente
Turbidez	NTU							4.41				37.40				64.7
Aluminio Disuelto	mg/L				0.055	<0.03	0.14	<0.03	0.031	<0.03	0.08	0.18	0.033	<0.03	0.13	0.14
Aluminio Total		0.2			1.09	<0.03	3.7	0.08	1.89	<0.03	8.1	3.92	3.05	0.1	16.4	7.68
Antimonio Disuelto					<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	0.0013	<0.0004	<0.0004	<0.0004	0.0009	0.0007
Antimonio Total		0.006			<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	0.0005	<0.0004	0.0007	0.0007
Arsénico Disuelto					0.00139	0.0005	0.0024	0.0013	0.0032	0.0007	0.0076	0.0011	0.00382	0.0022	0.0054	0.0016
Arsénico Total		0.01	0.1		0.00177	0.0013	0.0028	0.0015	0.00387	0.0025	0.0074	0.0021	0.00446	0.003	0.0061	0.0036
Bario Disuelto					0.0447	0.023	0.072	0.054	0.0618	0.027	0.136	0.052	0.0946	0.052	0.143	0.095
Bario Total		1			0.0556	0.039	0.069	0.056	0.0806	0.055	0.136	0.087	0.2142	0.088	0.99	0.146
Berilio Disuelto					<0.002	<0.002	<0.01	<0.01	<0.002	<0.002	<0.01	0.01	<0.002	<0.002	<0.01	<0.01
Berilio Total		0.004			0.002	<0.002	<0.01	<0.01	<0.002	<0.002	0.003	<0.01	<0.002	<0.002	0.003	<0.01
Bismuto Disuelto					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.1	<0.04	<0.04	<0.04	0.04	<0.04
Bismuto Total					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Boro Disuelto					0.01	<0.01	0.01	<0.01	0.361	<0.01	1.8	0.02	<0.01	<0.01	0.01	0.02
Boro Total					0.01	<0.01	0.02	<0.01	0.379	<0.01	1.93	0.03	0.013	<0.01	0.02	<0.01
Cadmio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmio Total		0.003	0.1		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	0.0003	0.0002
Calcio Disuelto					7.9	3.4	13.7	9.1	15.1	5.4	38.9	8.9	23.1	11.2	38.1	18.1
Calcio Total					7.73	3.4	13.1	8.7	14.81	5.9	37.5	9.5	23.04	11.5	36.7	17.9
Cromo Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Cromo Total		0.1	0.1		0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01
Cobalto Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalto Total					<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Cobre Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Cobre Total		1.3	3		<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Galio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hierro Disuelto					0.055	0.03	0.09	0.03	0.097	<0.02	0.28	0.12	0.022	<0.02	0.07	0.08
Hierro Total		0.3			0.7	0.16	1.8	0.12	1.3	0.33	4.8	2.03	1.8	0.08	9.5	3.44
Plomo Disuelto					<0.0001	<0.0001	0.0001	<0.0001	0.0002	<0.0001	0.0014	0.0002	<0.0001	<0.0001	<0.0001	0.0003
Plomo Total		0.015	0.4		0.0003	<0.0001	0.0012	<0.0001	0.0007	<0.0001	0.0028	0.0015	0.0015	<0.0001	0.0083	0.0032
Litio Disuelto				<0.02	<0.02	<0.02	<0.008	0.13	<0.02	0.67	0.017	<0.02	<0.02	<0.02	<0.008	
Litio Total				<0.02	<0.02	<0.02	<0.008	0.133	<0.02	0.68	0.01	<0.02	<0.02	<0.02	<0.008	
Magnesio Disuelto				1.5	0.8	2.5	1.7	3	1.4	7.4	2.2	4.1	2.2	6.4	3.2	
Magnesio Total				1.5	0.9	2.5	1.8	3.1	1.8	7.5	2.4	4.3	2.6	6.5	3.3	
Manganeso Disuelto				0.025	0.006	0.047	0.014	0.114	<0.005	0.551	0.037	0.032	0.014	0.074	0.012	
Manganeso Total	0.4			0.0406	0.014	0.062	0.017	0.1482	0.04	0.543	0.085	0.0981	0.019	0.342	0.064	
Mercurio Disuelto				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Mercurio Total	0.002	0.01		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molibdeno Disuelto				<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW5-E				SW6-E				SW7-E			
					Río Tapalapa – Aguas arriba				Río Los Vados				Quebrada La Honda			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
Molibdeno Total	mg/L				<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02
Níquel Disuelto					<0.01	<0.01	0.01	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008
Níquel Total		0.61		2	0.013	<0.01	0.03	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	0.04	<0.008
Potasio Disuelto					3	2.5	3.7	2.9	4.1	3.2	7.1	3.5	4.1	3.6	5.4	4.8
Potasio Total					3	2.2	4.1	3	4.2	3.1	7.5	4	4.5	3.6	7	5.3
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Escandio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenio Disuelto					<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Selenio Total		0.17			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0001
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Plata Total					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00006	<0.00005
Sodio Disuelto					6.34	3.7	10.8	5.9	32.16	6	135	7.2	11.69	8.7	15.4	8
Sodio Total					5.99	3.4	9.4	6.1	31.11	5.3	124	7.3	11.45	8.3	15.5	7.6
Estroncio Disuelto					0.06	0.02	0.09	0.072	0.12	0.03	0.33	0.066	0.17	0.07	0.29	0.124
Estroncio Total					0.057	0.02	0.08	0.072	0.122	0.04	0.35	0.071	0.174	0.09	0.28	0.125
Talio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001
Talio Total		0.002			<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	0.0002	0.0001
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04
Estaño Total					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04
Titanio Disuelto					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.009	<0.005	<0.005	0.006	<0.005
Titanio Total					0.027	<0.005	0.094	<0.005	0.05	<0.005	0.22	0.106	0.069	<0.005	0.325	0.154
Uranio Disuelto					<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Uranio Total					<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	0.0003	0.0001	0.00013	<0.0001	0.0005	0.0002
Vanadio Disuelto					<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.01	0.007	<0.0005	<0.0005	0.008	<0.005
Vanadio Total					<0.005	<0.005	0.009	<0.005	<0.005	<0.005	0.005	0.005	0.0047	<0.0005	0.018	0.007
Zinc Disuelto					0.04	<0.01	0.1	<0.01	<0.1	<0.1	0.4	<0.01	0.131	<0.01	0.81	<0.01
Zinc Total		7.4		10	0.197	<0.01	1.6	<0.01	<0.1	<0.1	0.22	<0.01	0.339	<0.01	1.87	0.01
Grasas y Aceites			10	10	<2.062	<2.02	<2.084	<2	<2.062	<2.02	<2.084	<2.1	<2.062	<2.02	<2.084	<2.2
DQO			125		6.5	<10	20	<10	<10	<10	30	<10	10	<10	40	19
Cloruros		250			1.8	1	3	2.3	43.9	3	230	7.2	3	5	3	5.7
Cianuro Total	0.14		1	0.003	<0.003	0.014	<0.003	<0.003	<0.003	0.014	<0.003	<0.003	0.015	<0.003	<0.003	
Fluoruros	4			<0.1	<0.1	<0.1	0.09	0.11	<0.1	0.3	0.08	<0.1	0.2	0.1	0.13	
Nitratos/Nitritos como N				0.13	0.03	0.42	<0.02	0.3	<0.02	1.22	2.25	<0.1	3.53	0.19	3.41	
Amonio				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	
Nitrógeno Kjeldahl (TKN)				0.21	<0.1	0.4	<0.1	0.2	0.1	0.5	0.6	<0.1	0.7	0.4	0.9	
Fosfatos				0.04	<0.03	0.2	<0.06	0.08	<0.03	0.3	0.09	0.1	0.2	0.09	0.22	
Fósforo Disuelto (Orto)				0.15	<0.01	0.06	<0.02	0.03	<0.01	0.09	0.02	0.03	0.08	0.03	0.06	
Fósforo Total		2	10	0.02	<0.01	0.05	<0.02	0.04	0.02	0.08	0.06	0.03	0.19	0.19	0.11	
STD (TDS)	500			84	60	110	104	187	90	540	130	140	240	100	246	
SST (TSS)		50	100	9	<5	32	<5	21	<5	105	42	<5	330	6	30.0	
ST (TS)				97	70	130	100	221	120	550	180	150	610	140	282	
Sulfatos	250			16.5	<10	47	21.1	14	<10	23	11.8	9	38	19.4	27.4	
Alcalinidad Total				25	13	43	26.2	48	22	108	24	30	101	54	38.4	
Hidrocarburos totales (TPH)				<0.1	<0.09	<0.09	<0.1	11.54375	<0.1	92	<0.1	<0.09	<0.1	<0.1	<0.1	

Dónde: **u.e.:** unidades exponenciales; **mg/L:** miligramos por litro; **µS/cm:** micro siemens por centímetro; **°C:** grados centígrados; **NMP/100ml:** número más probable en 100ml; **u Pt/Co:** unidades platino cobalto; **NR =** Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

Cuadro 4-4: Resultados de la Calidad del Agua Superficial, Proyecto Minero Escobal (4/4)

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW8-E				SW9-E			
					Aguas debajo de la confluencia del Río San Rafael Y el Río El Dorado				Río Tapalapa, aguas debajo de la confluencia del Río San Rafael Río Los Vados y Quebrada La Honda			
					Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	7.49	7	9.8	7.57	7.86	7.5	10.7	8.06
Temperatura (campo)	°C				22.1	18.9	25.1	21.3	21.8	19.1	24.2	19.2
Conductividad (campo)	µS/cm				363.7	186.8	807.6	338.4	267.4	121.8	518	178.7
Oxígeno disuelto (campo)	mg/L				5.14	0.28	7.48	6.35	6.2	0.8	8.5	8.06
Cr VI					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DBO					15	15	25	18	<10	<10	<10	<10
Coliformes Fecales	NMP/100ml				2x10 ⁶	2x10 ⁴	5x10 ⁶	9.2x10 ⁵	9x10 ⁴	1x10 ²	2x10 ⁵	2.4 x 10 ⁵
Color Real	U Pt/Co				172	19	351	4	342	29	824	25
Materia Flotante								Presente				Presente
Turbidez	NTU				14.15	6.09	22.2	22.2	25.72	4.93	46.5	50.6
Aluminio Disuelto	mg/L				0.033	<0.03	0.06	0.15	0.087	<0.03	0.22	0.24
Aluminio Total		0.2			2.39	0.04	7.35	1.27	2.96	0.4	8.6	3.16
Antimonio Disuelto					0.001	<0.0004	0.0033	0.0007	0.0006	<0.0004	0.0013	<0.0004
Antimonio Total		0.006			0.001	<0.0004	0.0027	0.0007	0.0007	<0.0004	0.0012	0.0004
Arsénico Disuelto					0.0043	0.0025	0.0064	0.0039	0.004	0.0023	0.0057	0.0023
Arsénico Total		0.01	0.1		0.006	0.0041	0.0096	0.0051	0.0042	0.002	0.006	0.0036
Bario Disuelto					0.107	0.074	0.143	0.113	0.094	0.056	0.135	0.074
Bario Total		1			0.136	0.102	0.185	0.137	0.121	0.09	0.154	0.105
Berilio Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Berilio Total		0.004			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Bismuto Disuelto					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Bismuto Total					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Boro Disuelto					0.022	<0.01	0.05	0.01	0.043	<0.01	0.09	0.04
Boro Total					0.023	<0.01	0.06	0.03	0.041	<0.01	0.1	0.05
Cadmio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmio Total		0.003	0.1		<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0002	0.0001
Calcio Disuelto					50.4	17.5	156	42.8	35.7	18.2	78.3	20.5
Calcio Total					52.1	18.6	156	44.4	36.2	18.5	79.7	21.9
Cromo Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cromo Total		0.1	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalto Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalto Total					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobre Disuelto					<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Cobre Total		1.3	3		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Galio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hierro Disuelto					0.06	0.02	0.11	0.17	0.09	<0.02	0.17	0.13
Hierro Total		0.3			1.53	0.05	4.36	1.47	1	0.25	2.2	1.86
Plomo Disuelto				0.0001	<0.0001	0.0003	0.0003	0.0002	<0.0001	0.0005	0.0002	
Plomo Total	0.015	0.4		0.003	<0.0001	0.0089	0.0035	0.0022	0.0002	0.008	0.0021	
Litio Disuelto				<0.02	<0.02	0.04	0.018	<0.02	<0.02	0.04	0.022	
Litio Total				<0.02	<0.02	0.04	0.01	<0.02	<0.02	0.04	0.016	
Magnesio Disuelto				6.3	3.2	14.7	5.3	6	3.3	9.7	3.7	
Magnesio Total				6.6	3.3	14.8	5.5	6.2	3.4	10.1	3.9	
Manganeso Disuelto				0.095	0.009	0.118	0.259	0.057	0.023	0.148	0.055	
Manganeso Total	0.4			0.1808	0.047	0.349	0.304	0.115	0.043	0.187	0.124	
Mercurio Disuelto				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Mercurio Total	0.002	0.01		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	SW8-E				SW9-E			
					Aguas debajo de la confluencia del Río San Rafael Y el Río El Dorado				Río Tapalapa, aguas debajo de la confluencia del Río San Rafael Río Los Vados y Quebrada La Honda			
					Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
Molibdeno Disuelto	mg/L				<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02
Molibdeno Total					<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02
Níquel Disuelto					<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008
Níquel Total		0.61		2	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008
Potasio Disuelto					6.5	5.8	7.4	9.3	6	4.5	8.1	4.9
Potasio Total					6.8	6.4	7.8	9.6	6.1	4.8	8.5	5.3
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Escandio Total					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenio Disuelto					<0.0001	<0.0001	0.0002	0.0002	<0.0001	<0.0001	0.0001	<0.0001
Selenio Total		0.17			0.00011	<0.0001	0.0002	0.0001	<0.0001	<0.0001	0.0001	0.0001
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Plata Total					<0.00005	<0.00005	0.00007	0.00018	<0.00005	<0.00005	0.00007	<0.00005
Sodio Disuelto					18.8	12.3	33.7	23.5	17.6	10.7	26.9	12.5
Sodio Total					18.4	12.9	34.3	24	17.4	11	28.5	13
Estroncio Disuelto					0.44	0.16	1.5	0.447	0.29	0.14	0.71	0.172
Estroncio Total					0.44	0.16	1.48	0.448	0.295	0.14	0.73	0.175
Talio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Talio Total		0.002			<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	0.0002	<0.0001
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04
Estaño Total					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04
Titanio Disuelto					<0.005	<0.005	0.005	0.011	<0.005	<0.005	0.009	0.012
Titanio Total					0.069	<0.005	0.195	0.052	0.084	0.015	0.237	0.094
Uranio Disuelto					0.00014	<0.0001	0.0003	0.0001	0.00014	<0.0001	0.0002	<0.0001
Uranio Total					0.00022	0.0001	0.0003	0.0002	0.00022	0.0002	0.0003	0.0002
Vanadio Disuelto					<0.005	<0.005	0.006	0.008	<0.005	<0.005	0.006	0.009
Vanadio Total					<0.005	<0.005	0.01	<0.005	0.0054	<0.005	0.012	0.005
Zinc Disuelto					<0.01	<0.01	0.03	0.01	<0.01	<0.01	0.03	<0.01
Zinc Total		7.4		10	0.015	<0.01	0.04	0.02	<0.01	<0.01	0.03	<0.01
Grasas y Aceites			10	10	<2.04	<2.02	<2.062	3.6	<2.02	<2.02	<5	<2.5
DQO			125		20	<10	40	41	17.8	<10	35	15
Cloruros			250		10	7	19	16.5	12	6	20	12.5
Cianuro Total			0.14	1	0.007	<0.003	0.014	<0.003	0.006	<0.003	0.013	<0.003
Fluoruros			4		0.27	0.1	0.6	0.20	0.006	<0.003	0.013	0.14
Nitratos/Nitritos como N				3.07	2.01	5.23	2.11	1.97	1.14	3.85	2.09	
Amonio				0.24	<0.05	0.58	1.18	0.129	<0.05	0.22	<0.05	
Nitrógeno Kjeldahl (TKN)				0.74	<0.1	1.6	2.8	0.57	0.3	0.9	0.8	
Fosfatos				0.55	0.3	1	1.05	0.49	0.22	1.3	0.25	
Fósforo Disuelto (Orto)				0.18	0.08	0.33	0.27	0.18	0.09	0.49	0.07	
Fósforo Total		2	10	0.27	0.12	0.51	0.58	0.25	0.09	0.58	0.13	
STD (TDS)	500			312	160	750	304	255	160	440	194	
SST (TSS)		50	100	34	<5	102	38.0	73	<5	340	50	
ST (TS)				362	180	750	330	310	200	450	246	
Sulfatos	250			91	22	360	80.8	60	25	169	36	
Alcalinidad Total				79	50	110	87.3	70	45	90	45.3	
Hidrocarburos totales (TPH)				<0.01	<0.01	<0.01	0.2	70	45	90	0.1	

Dónde: u.e.: unidades exponenciales; mg/L: miligramos por litro; µS/cm: micro siemens por centímetro; °C: grados centígrados; NMP/100ml: número más probable en 100ml; u Pt/Co: unidades platino cobalto; Fuente: MSR, 2016.

4.3.3 Agua Subterránea

En el Cuadro 4-5 se presentan los resultados de la calidad del agua subterránea (manantiales) y los resultados de laboratorio se presentan en el Anexo 11.5.2. Todos los parámetros analizados en las estaciones GW-1A, GW-2, GW-3, GW-4 y GW-5 cumplen con el Acuerdo 236-2006, a excepción la materia flotante encontrada en GW-2.

La temperatura de las estaciones muestreadas se encontró entre 22.3 y 26.0 °C. La lectura menor de pH se obtuvo en la estación GW-3 (6.4 u.e.) y la mayor en la estación GW-1A (6.87 u.e.). Los Sólidos Suspendidos Totales (**SST**) no fueron registrados en ninguna estación de monitoreo. Las concentraciones registradas de Cloruros están por debajo de las guías de la USEPA (250 mg/L).

La concentración de sulfatos está por debajo de las guías de la USEPA (250mg/L) en todas las estaciones de monitoreo. Los sólidos disueltos totales (**TDS**) están por debajo de las directrices de la USEPA (500mg/L) en la mayoría de las estaciones a excepción de GW3, encontrándose ligeramente por encima del valor guía.

El Cadmio, Cianuro, Berilio, Bismuto, Cobalto, Cobre, Cromo, Galio, Litio, Cromo hexavalente, Mercurio, Molibdeno, Níquel, Escandio, Talio, Estaño, Plata, Uranio y Zinc no fueron detectados en ninguna de las estaciones. El Selenio fue detectado en todas las estaciones, y sus concentraciones se registraron por debajo de la guía de la USEPA (0.17mg/L). El Antimonio fue detectado en las estaciones GW2 y GW3 en concentraciones por debajo de la guía dada por la USEPA (0.01 mg/L). El Plomo se registró en GW-1A y GW-2 en concentración por debajo de la guía de la USEPA y Acuerdo (0.015 y 0.4 mg/L respectivamente). En todas las estaciones se registró Arsénico. Sin embargo las concentraciones registradas se encuentran por debajo de los valores máximos establecidos durante la línea base y todos por debajo de las guías sugeridas por USEPA (0.01 mg/L) y el Acuerdo (0.1 mg/L).

Cuadro 4-5: Resultados de la Calidad de Agua Subterránea (manantiales), Proyecto Minero Escobal

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	GW1-A				GW-2				GW-3				GW-4				GW-5																			
					Nacimiento Aldea El Volcancito				Nacimiento Aldea El Fucío				Nacimiento – Zona central del Proyecto (frente al portal oeste)				Manantial – Aguas arriba del depósito de colas				Manantial – Aguas arriba del depósito de colas debajo de GW-4																			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16																
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo													
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	7.08	6.89	7.26	6.87	6.54	6.01	7.16	6.59	6.54	6.21	7.13	6.4	6.13	6.13	6.13																					
Temperatura de campo	°C				15.2	14.8	15.6	24.7	21.4	19	23.7	22.3	19.4	18.5	21	26.0	18.1	18.1	18.1																					
Conductividad de campo	µS/cm				229.8	223	236.5	121.3	323.4	111.3	500.5	249.0	315.3	236.7	501.1	711.3	147.3	147.3	147.3																					
Oxígeno Disuelto de campo	mg/L				0.1	0.03	0.17	6.97	1.18	0.13	2.35	5.52	0.68	0.03	1.26	3.32	0.14	0.14	0.14																					
Turbidez	NTU							29.7				25.4				0.57																								
Materia Flotante				Ausente				Ausente				Presente				Ausente																								
Color Aparente	u Pt/Co			500	NR	NR	NR	139	NR	NR	NR	209	NR	NR	NR	14	NR	NR	NR																					
Color Real	u Pt/Co							<1				38				<1																								
Cr (VI)	mg/L			0.1				<0.05				<0.05				<0.05																								
Coliformes Fecales	NMP/100mL			<1x10 ⁴				240				23				<2																								
Aluminio Disuelto		0.2			<0.03	<0.03	<0.03	0.13	0.075	<0.03	0.24	0.22	<0.03	<0.03	0.04	<0.03	1.42	1.42	1.42																					
Antimonio Disuelto		0.01			<0.0004	<0.0004	<0.0004	<0.0004	0.00078	<0.0004	0.0011	0.001	0.0004	<0.0004	0.001	0.0005	<0.0004	<0.0004	<0.0004																					
Arsénico Disuelto		0.01		0.1	0.001	0.0008	0.0011	0.0013	0.0156	0.0043	0.0299	0.0072	0.0059	0.0037	0.0115	0.0025	0.0008	0.0008	0.0008																					
Bario Disuelto		1			0.025	0.022	0.028	0.071	0.24	0.125	0.451	0.12	0.186	0.12	0.328	0.127	0.127	0.127	0.127																					
Berilio Disuelto		0.004			<0.01	<0.002	<0.01	<0.01	<0.01	<0.002	<0.01	<0.01	<0.01	<0.002	<0.01	<0.002	<0.002	<0.002	<0.002																					
Bismuto Disuelto					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04																					
Boro Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01																					
Cadmio Disuelto		0.003		0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001																					
Calcio Disuelto					5.7	5.1	6.2	7	33.5	9.6	65.3	15.1	31.6	25.7	43.4	83.9	4.4	4.4	4.4																					
Cromo Disuelto		0.1		0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																					
Cobalto Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																					
Cobre Disuelto		1.3		3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																					
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																					
Hierro Disuelto		0.3			0.02	<0.02	0.03	0.1	0.103	0.03	0.17	0.18	0.103	<0.02	0.33	<0.02	0.74	0.74	0.74																					
Plomo Disuelto		0.015		0.4	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0003	<0.0001	<0.0001	0.0001	<0.0001	0.0009	0.0009	0.0009																					
Litio Disuelto					<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	
Magnesio Disuelto					3.1	2.9	3.3	2.7	5.9	1.8	12	2.7	4.9	3.3	8.3	17.6	2.6	2.6	2.6																					
Manganeso Disuelto		0.05			<0.005	<0.005	<0.005	0.068	0.123	0.02	0.356	0.07	0.057	<0.005	0.133	<0.005	0.069	0.069	0.069																					
Mercurio Disuelto		0.002		0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002																					
Molibdeno Disuelto					<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01																					
Níquel Disuelto	mg/L	0.61		2	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01																					
Potasio Disuelto					7.3	5.9	8.6	5.6	2.9	1.3	4.3	1.6	3.8	2.5	5	9.2	4.6	4.6	4.6																					
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																					
Selenio Disuelto		0.17			0.0002	<0.0001	0.0003	0.0002	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0005	<0.0001	<0.0001	<0.0001																					
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005																					
Sodio Disuelto					17.6	16.9	18.2	8.3	13.5	7.2	22	7.4	11.5	9.3	16.4	21.2	10.3	10.3	10.3																					
Estroncio Disuelto					0.03	0.03	0.03	0.061	0.26	0.08	0.56	0.124	0.2	0.12	0.37	0.41	0.03	0.03	0.03																					
Talio Disuelto					<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.1	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001																					
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<																														

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	GW1-A				GW-2				GW-3				GW-4				GW-5			
					Nacimiento Aldea El Volcancito				Nacimiento Aldea El Fucío				Nacimiento – Zona central del Proyecto (frente al portal oeste)				Manantial – Aguas arriba del depósito de colas				Manantial – Aguas arriba del depósito de colas debajo de GW-4			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
STD (TDS)	mg/L	500			190	190	190	210	223	130	350	170	213	190	260	532	170	170	170	NA	NR	NR	NR	NA
SST (TSS)			50	100	6.5	6	7	<5	7.7	6	9	<5	39	5	105	<5	206	206	206					
ST (TS)					200	180	220	210	237.5	140	380	172	217.5	170	270	546	360	360	360					
Sulfatos		250			12.5	11	14	8.9	43	7	90	16.5	30	16	71	221	7	7	7					
Alcalinidad Total					31	31	31	32.1	0.18	0.09	0.27	57.7	83	71	97	113	35	35	35					

NA: no analizado por no encontrar agua al momento de la obtención de la muestra. GW-5 fue clausurado y no se reportan resultados para el presente informe trimestral. u.e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NMP/100ml: número más probable en 100ml. u Pt/Co: unidades platino cobalto. NR = Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

Cuadro 4-6: Resultados de la medición de calidad de agua subterránea (Pozos de Monitoreo, Producción y Artesanal), Proyecto Minero Escobal (1/3)

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW-2				MW-3				MW-4				MW-5			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	6.56	6.37	6.77	NA	6.44	6.34	6.49	6.56	6.32	6.23	6.41	6.59	6.19	6.04	6.34	6.35
Temperatura de campo	°C				24.4	23.4	25.1		24.1	23.7	24.5	25.5	23.3	22.2	24.4	27.2	23.4	23	24.6	24.7
Conductividad de campo	μS/cm				427.5	211.9	1001.3		803.9	741.6	829.1	482.4	916.9	872.1	944.8	416.2	469.7	401.4	494.1	723.9
Oxígeno Disuelto de campo	mg/L				0.75	0.3	1.21		0.65	0.11	1.44	4.91	0.97	0.48	1.93	4.83	0.82	0.19	1.77	3.87
Turbidez	NTU											0.24				0.33				1.01
Materia flotante	Visual			Ausente								Ausente				Ausente				Ausente
Color Aparente	u Pt/Co			500	NR	NR	NR		NR	NR	NR	<1	NR	NR	NR	<1	NR	NR	NR	<1
Color Real												<1				<1				<1
Cr (VI)	mg/L			0.1								<0.05				<0.05				<0.05
Coliformes Fecales	NMP/100mL			<1x10 ⁴								<2				<2				<2
Aluminio Disuelto		0.2			0.038	<0.03	0.07		<0.03	<0.03	<0.03	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Antimonio Disuelto		0.01			<0.0004	<0.0004	<0.0004		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	0.0005
Arsénico Disuelto		0.01		0.1	0.0011	0.0008	0.0014		0.0023	0.0021	0.0027	0.0023	0.0023	0.0021	0.0028	0.0025	0.0013	0.001	0.0016	0.001
Bario Disuelto		1			0.03	0.024	0.039		0.036	0.032	0.041	0.036	0.042	0.038	0.047	0.024	0.162	0.157	0.166	0.039
Berilio Disuelto		0.004			<0.002	<0.002	0.003		<0.002	<0.002	0.003	<0.01	<0.002	<0.002	0.003	<0.01	<0.002	<0.002	0.003	<0.01
Bismuto Disuelto					<0.04	<0.04	<0.04		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Boro Disuelto					0.014	<0.01	0.04		0.06	0.05	0.07	0.07	0.078	0.06	0.09	0.06	0.015	<0.01	0.03	0.03
Cadmio Disuelto		0.003		0.1	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcio Disuelto					20.6	9.4	48.7		80.3	76.4	83.3	78.3	100	93	107	71.8	40.8	39.2	42.2	133
Cromo Disuelto		0.1		0.1	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalto Disuelto					<0.01	<0.01	<0.1		<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobre Disuelto		1.3		3	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Galio Disuelto					<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hierro Disuelto		0.3			<0.02	<0.02	0.02		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Plomo Disuelto		0.015		0.4	<0.0001	<0.0001	0.0001		<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	0.0002	<0.0001
Litio Disuelto					<0.02	<0.02	<0.02		<0.02	<0.02	0.02	0.015	<0.02	<0.02	0.02	0.014	<0.02	<0.02	<0.02	<0.008
Magnesio Disuelto					3.5	2.4	6.1		10.3	10.1	10.7	9.4	11.3	10.9	11.6	7.8	7.3	6.8	7.6	17.3
Manganeso Disuelto		0.05			0.108	0.03	0.308		<0.005	<0.005	0.008	<0.005	0.009	<0.005	0.021	<0.005	<0.005	<0.005	<0.005	<0.005
Mercurio Disuelto		0.002		0.01	<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molibdeno Disuelto					<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02
Níquel Disuelto		0.61		2	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008
Potasio Disuelto					2.2	1.9	2.4		4.2	3.9	4.6	4	4.7	4.5	5.2	3.9	6	5.5	6.5	7.7
Escandio Disuelto					<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Selenio Disuelto		0.17			0.0002	0.0001	0.0002		0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003	0.0004	0.0003	0.0004	0.0006
Plata Disuelta					<0.00005	<0.00005	<0.00005		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Sodio Disuelto					22	17.4	33.6		29.5	28.2	30.9	27.1	32.3	30.4	35.8	24.6	16.9	15.6	19.1	29.5
Estroncio Disuelto					0.18	0.07	0.46		0.74	0.71	0.77	0.707	0.89	0.84	0.98	0.62	0.27	0.26	0.29	0.471
Talio Disuelto					<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Estaño Disuelto					<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04
Titanio Disuelto					<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	0.01
Uranio Disuelto					0.00016	<0.0001	0.0005		0.0002	0.0002	0.0002	0.0001	<0.0002	<0.0002	0.0002	0.0001	0.00033	0.0001	0.001	0.0004
Vanadio Disuelto					0.0059	<0.005	0.008		0.0055	<0.005	0.009	0.005	0.006	<0.005	0.009	0.006	<0.005	<0.005	<0.005	<0.005
Zinc Disuelto		7.4		10	0.031	<0.01	0.11		0.053	<0.01	0.1	0.04	<0.01	<0.01	0.1	0.02	<0.01	<0.01	0.1	0.03
Cloruros		250			12	3	28		16	16	17	16.2	20	19	21	13.2	9	8	9	22.6
Cianuro Total		0.14		1	0.0039	<0.003	0.011		0.005	<0.003	0.014	<0.003	0.005	<0.003	0.015	<0.003	0.005	<0.003	0.015	<0.003
Fluoruros					0.35	0.2	0.7		0.8	0.8	0.8	0.81	0.8	0.8	0.8	0.90	0.18	0.1	0.2	0.25
Nitratos/Nitritos como N					2.48	2.04	2.93		2.2	2.08	2.26	2.49	2.13	1.98	2.32	2.59	3.32	3	3.57	6.32
Amonio					<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrógeno Kjeldahl (TKN)					0.56	<0.1	1.1		<0.1	<0.1	0.2	0.1	<0.1	<0.1	0.3	0.1	<0.1	<0.1	0.3	<0.1

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW-2				MW-3				MW-4				MW-5			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
Fosfatos	mg/L				0.233	0.21	0.27		0.315	0.27	0.37	0.25	0.248	0.24	0.27	0.22	0.203	0.15	0.24	0.12
Fósforo Total			2	10	0.24	0.06	0.44		0.09	0.08	0.1	0.08	0.07	0.06	0.08	0.07	0.06	0.05	0.07	0.04
STD (TDS)		500			253	190	360		470	460	480	490	553	540	560	442	305	290	320	732
SST (TSS)			50	100	345.8	137	584		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
ST (TS)					597.5	350	810		487.5	450	510	496	555	520	580	442	325	280	350	732
Sulfatos		250			28.5	4	97		166	162	169	175	212.5	210	220	146	72.3	64	76	326
Alcalinidad Total					64	56	80		84	82	86	102	85	83	88	83.9	66	61	68	88.6

NA: no analizado por no encontrar agua al momento de la obtención de la muestra. e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NMP/100ml: número más probable en 100ml. u Pt/Co: unidades platino cobalto. NR = Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

Cuadro 4-6: Resultados de la medición de calidad de agua subterránea (Pozos de Monitoreo, Producción y Artesanal), Proyecto Minero Escobal (2/3)

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW-6				MW-7				MW-8				MW-9								
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16					
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo						
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	6.22	6.17	6.25	6.22	6.38	6.14	6.98	6.73	6.16	6.07	6.29	6.33	7.15	6.9	7.4	6.78					
Temperatura de campo	°C				22.3	21.6	22.8	23.4	22.4	22	23.1	19.2	23.3	23.2	23.4	24.8	27.5	25.9	29	28.6					
Conductividad de campo	µS/cm				538.2	342.9	752.6	977.1	299.6	285.9	323.8	264.1	426.8	424.6	428.1	550.8	1595	1569	1621	335.7					
Oxígeno Disuelto de campo	mg/L				0.69	0.19	1.67	4.16	0.61	0.25	1.19	3.24	0.72	0.16	1.45	4.52	0.38	0.35	0.41	1.15					
Turbidez	NTU							1.12				9.52				1.45				0.9					
Materia flotante	Visual			Ausente				Ausente				Ausente				Ausente				Ausente					
Color Aparente	u Pt/Co			500	NR	NR	NR	<1	NR	NR	NR	<1	NR	NR	NR	<1	NR	NR	NR	<1					
Color Real				<1																			<1		
Cr (VI)	mg/L			0.1																	<0.05				
Coliformes Fecales	NMP/100mL			<1x10 ⁴																	<2				
Aluminio Disuelto	mg/L	0.2																			<0.03	<0.03	0.05	<0.03	0.053
Antimonio Disuelto		0.01			0.00045	<0.0004	0.0012	<0.0004	0.00063	0.0005	0.0008	0.0011	0.001	0.0009	0.0011	0.0008	<0.0004	<0.0004	<0.0004	<0.0004					
Arsénico Disuelto		0.01	0.1		0.0028	0.0024	0.0032	0.0025	0.0034	0.0029	0.0041	0.0016	0.0021	0.0019	0.0024	0.0016	0.003	0.0007	0.0052	0.0017					
Bario Disuelto		1			0.198	0.134	0.281	0.13	0.156	0.129	0.176	0.366	0.125	0.122	0.129	0.07	0.031	0.028	0.034	0.057					
Berilio Disuelto		0.004			<0.002	<0.002	0.003	<0.01	<0.002	<0.002	0.003	<0.01	<0.002	<0.002	0.003	<0.01	<0.01	<0.002	<0.01	<0.01					
Bismuto Disuelto					<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04					
Boro Disuelto					<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	0.09	0.08	0.1	0.03					
Cadmio Disuelto		0.003	0.1		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
Calcio Disuelto					52.5	35.1	71.9	188	16.7	13.9	19.6	30.9	34.6	32.5	36.3	89.5	185.5	170	201	43.6					
Cromo Disuelto		0.1	0.1		<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01					
Cobalto Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Cobre Disuelto		1.3	3		<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01					
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hierro Disuelto		0.3			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.17	<0.02	<0.02	<0.02	<0.02	5.52	1.53	9.51	6.06					
Plomo Disuelto		0.015	0.4		<0.0001	<0.0001	<0.0001	<0.0001	0.00013	<0.0001	0.0002	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
Litio Disuelto					<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	0.008	0.07	0.07	0.07	0.01					
Magnesio Disuelto					7.5	4.9	10.5	22.1	4.8	4.6	5	8.7	6.4	6.3	6.7	14	35.8	34.4	37.2	7.5					
Manganeso Disuelto		0.05			<0.005	<0.005	0.006	0.005	0.0065	<0.005	0.012	0.133	0.019	0.012	0.029	<0.005	0.203	0.149	0.257	0.069					
Mercurio Disuelto		0.002	0.01		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002					
Molibdeno Disuelto					<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02					
Níquel Disuelto		0.61	2		<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008					
Potasio Disuelto					5.7	5	6.5	9.9	6.2	5.4	6.8	8.3	4.8	4.6	5.1	6	4.8	4.6	5	4.3					
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Selenio Disuelto		0.17			0.0005	0.0004	0.0005	0.0007	0.0002	0.0001	0.0002	0.0014	0.0004	0.0003	0.0006	0.0005	<0.0001	<0.0001	<0.0001	<0.0001					
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00007	<0.00005					
Sodio Disuelto					14	12.3	17	35.7	19.1	15.4	27.5	18	15.2	15	15.6	22.3	45.1	44.7	45.4	26					
Estroncio Disuelto					0.26	0.18	0.35	0.834	0.1	0.09	0.11	0.193	0.22	0.21	0.23	0.325	1.64	1.58	1.69	0.3					
Talio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	0.41	<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04					
Titanio Disuelto					<0.005	<0.005	<0.005	0.01	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005					
Uranio Disuelto					0.00013	0.0001	0.0002	0.0002	<0.0001	<0.0001	0.0001	<0.0001	0.00017	0.0001	0.0002	0.0002	<0.0001	<0.0001	0.0004	<0.0001					
Vanadio Disuelto					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005					
Zinc Disuelto		7.4	10		0.034	<0.01	0.1	0.06	0.034	<0.01	0.1	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	0.02					
Cloruros		250			11	6	17	41.8	11	9	12	13.8	6	6	6	17.8	37	36	37	7.6					
Cianuro Total		0.14	1		0.005	<0.003	0.015	<0.003	0.005	<0.003	0.015	<0.003	0.005	<0.003	0.015	<0.003	0.007	<0.003	0.012	<0.003					
Fluoruros					0.18	0.1	0.2	0.14	0.13	0.1	0.2	0.14	0.17	0.1	0.2	0.15	2.55	2.5	2.6	0.50					
Nitratos/Nitritos como N					5.08	4.42	6.15	5.35	4.75	4.08	5.24	<0.02	2.76	2.63	2.83	4.29	<0.02	<0.02	<0.02	0.03					
Amonio					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05					
Nitrógeno Kjeldahl (TKN)					<0.1	<0.1	0.2	<0.1	0.21	<0.1	0.4	1.4	0.09	<0.1	0.2	<0.1	0.23	<0.1	0.4	0.1					

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Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW-6				MW-7				MW-8				MW-9			
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
Fosfatos	mg/L				0.173	0.15	0.21	0.12	0.113	0.09	0.18	<0.06	0.23	0.21	0.24	0.16	<0.03	<0.03	<0.03	0.47
Fósforo Total			2	10	0.05	0.04	0.06	0.04	0.04	0.01	0.07	0.11	0.07	0.06	0.08	0.06	<0.01	<0.01	0.02	0.16
STD (TDS)		500			340	260	440	1000	233	220	250	260	277	270	290	542	905	890	920	320
SST (TSS)			50	100	<5	<5	<5	<5	19.75	7	45	21.0	9	6	14	<5	27	25	29	<5
ST (TS)					345	240	450	1010	260	230	280	260	300	290	310	564	940	910	970	320
Sulfatos			250		85.3	33	153	520	19.3	17	23	6.9	54.7	54	55	218	440	440	440	69.7
Alcalinidad Total					65	62	68	51.0	48	41	60	131	68	66	70	71	147	136	157	110

NA: no analizado por no encontrar agua al momento de la obtención de la muestra. u.e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NMP/100ml: número más probable en 100ml. u Pt/Co: unidades platino cobalto. NR = Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

Cuadro 4-6: Resultados de la medición de calidad de agua subterránea (Pozos de Monitoreo, Producción y Artesanal), Proyecto Minero Escobal (3/3)

Parámetros	Unidad	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW11				PSA-SR				HW-1				RW-1				PSA-1				
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
pH de campo	u.e.	5.0-9.0	6.0-9.0	6.0-9.0	7.05	7.05	7.05	7.41	7.45	7.45	7.45	7.45				7.51				6.74				7.30	
Temperatura de campo	°C				30.4	30.4	30.4	31.2	27.8	27.8	27.8	28.9				23.7				25.1				34.3	
Conductividad de campo	µS/cm				2.243	2.243	2.243	1341	663.9	663.9	663.9	868.4				743.4				831.6				1058	
Oxígeno Disuelto de campo	mg/L				0.09	0.09	0.09	3.72	0.05	0.05	0.05	1.56				7.86				5.08				4.10	
Turbidez	NTU							2.68				1.22				28.0				1.63				1.69	
Materia flotante	Visual			Ausente				Ausente				Ausente				Ausente				Presente				Ausente	
Color aparente	u Pt/Co			500	NR	NR	NR	219	NR	NR	NR	<1				<1				<1				405	
Color Real								<1				<1				<1				<1				<1	
Cr (VI)	mg/L			0.1				<0.05				<0.05				<0.05				<0.05				<0.05	
Coliformes Fecales	NMP/100mL			<1x10 ⁴				<2				2				<2				23				<2	
Aluminio Disuelto	mg/L	0.2			<0.03	<0.03	<0.03	0.05	0.06	0.06	0.06	<0.03				0.03				<0.03				0.03	
Antimonio Disuelto		0.01			0.001	0.001	0.001	<0.0004	<0.0004	<0.0004	<0.0004	0.0006				0.0006				<0.0004				<0.0004	
Arsénico Disuelto		0.01		0.1	0.0022	0.0022	0.0022	0.003	0.0136	0.0136	0.0136	0.0125				0.0104				0.0005				0.0059	
Bario Disuelto		1			0.033	0.033	0.033	0.026	0.125	0.125	0.125	0.081				0.076				0.075				0.021	
Berilio Disuelto		0.004			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01				<0.01				<0.01	
Bismuto Disuelto					<0.08	<0.08	<0.08	<0.04	<0.04	<0.04	<0.04	<0.04				<0.04				<0.04				<0.04	
Boro Disuelto					0.18	0.18	0.18	0.17	0.07	0.07	0.07	0.11				0.09				0.08				0.1	
Cadmio Disuelto		0.003		0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.0001				<0.0001				<0.0001	
Calcio Disuelto					271	271	271	247	47.5	47.5	47.5	101				83.4				140				197	
Cromo Disuelto		0.1		0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01				<0.01				<0.01	
Cobalto Disuelto					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01				<0.01				<0.01	
Cobre Disuelto		1.3		3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01				<0.01				<0.01	
Galio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1				<0.1				<0.1	
Hierro Disuelto		0.3			0.21	0.21	0.21	2.1	0.05	0.05	0.05	<0.02				<0.02				<0.02				3.09	
Plomo Disuelto		0.015		0.4	0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		NR	NR	NR	<0.0001	NR	NR	NR	<0.0001	NR	NR	NR	<0.0001
Litio Disuelto					0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.141				0.117				<0.008				0.085	
Magnesio Disuelto					41.3	41.3	41.3	36.8	4.1	4.1	4.1	6.1				5.5				23				35.5	
Manganeso Disuelto		0.05			0.044	0.044	0.044	0.027	0.03	0.03	0.03	0.027				<0.005				<0.005				0.06	
Mercurio Disuelto		0.002		0.01	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				<0.0002				<0.0002				<0.0002	
Molibdeno Disuelto					0.01	0.01	0.01	<0.02	<0.01	<0.01	<0.01	<0.02				<0.02				<0.02				<0.02	
Níquel Disuelto		0.61		2	<0.01	<0.01	<0.01	<0.008	<0.01	<0.01	<0.01	<0.008				<0.008				<0.008				<0.008	
Potasio Disuelto					5	5	5	4.5	2.5	2.5	2.5	1.9				2.1				8.9				4.6	
Escandio Disuelto					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1				<0.1				<0.1	
Selenio Disuelto		0.17			0.0006	0.0006	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	0.0002				0.0003				<0.0001				<0.0001	
Plata Disuelta					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005				<0.00005				<0.00005				<0.00005	
Sodio Disuelto					77.4	77.4	77.4	71.2	55.2	55.2	55.2	81.9				68.5				41.4				46.8	
Estroncio Disuelto					2.23	2.23	2.23	2.26	1.33	1.33	1.33	4.45				3.56				1.09				1.85	
Talio Disuelto					0.0002	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001				<0.0001				<0.0001				<0.001	
Estaño Disuelto					<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04				<0.04				<0.04				<0.01	
Titanio Disuelto					<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	0.008				0.008				0.009				0.01	
Uranio Disuelto					0.0007	0.0007	0.0007	0.0004	0.0002	0.0002	0.0002	0.0003				0.0003				0.001				0.0005	
Vanadio Disuelto					<0.005	<0.005	<0.005	<0.005	0.005	0.005	0.005	<0.005				<0.005				<0.005				<0.005	
Zinc Disuelto		7.4		10	0.04	0.04	0.04	0.01	0.12	0.12	0.12	<0.01				0.02				<0.01				<0.01	
Cloruros		250			68	68	68	61.8	32	32	32	4.1				4.2				37				40.7	
Cianuro Total		0.14		1	<0.003	<0.003	<0.003	<0.003	0.003	0.003	0.003	<0.003				<0.003				<0.003				<0.003	
Fluoruros					2.7	2.7	2.7	2.45	0.7	0.7	0.7	0.86				0.72				0.9				2.45	
Nitratos/Nitritos como N					0.19	0.19	0.19	<0.02	<0.02	<0.02	<0.02	0.06				0.57				1.91				<0.02	
Amonio					<0.05	<0.05	<0.05	<0.05	0.06	0.06	0.06	<0.05				<0.05				<0.05				<0.05	
Nitrógeno Kjeldahl (TKN)					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1				<0.1				0.4				0.2	

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Parámetros	Unidad	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW11			PSA-SR			HW-1			RW-1			PSA-1							
					Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16	Línea Base			Jun-16				
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo					
Fosfatos	mg/L				0.03	0.03	0.03	<0.06	0.06	0.06	0.06	<0.06				0.09				0.12				<0.06
Fósforo Total			2	10	0.06	0.06	0.06	<0.02	0.02	0.02	0.02	<0.02				0.03				0.05				<0.02
STD (TDS)		500			1370	1370	1370	1350	320	320	320	640				536				790				992
SST (TSS)			50	100	145	145	145	<5	<5	<5	<5	<5	NR	NR	NR	<5	NR	NR	NR	5.0	NR	NR	NR	<5
ST (TS)					1000	1000	1000	1360	300	300	300	626				544				804				1020
Sulfatos		250			700	700	700	668	45	45	45	271				216				369				527
Alcalinidad Total					133	133	133	125	186	186	186	185				144				140				153

u.e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NMP/100ml: número más probable en 100ml. u Pt/Co: unidades platino cobalto. NR = Cálculo No Realizado por falta de datos de línea base. Fuente: MSR, 2016.

En el Cuadro 4-6 se presentan los resultados de la calidad del agua subterránea (Pozos de Monitoreo, Producción y Artesanal) correspondientes al mes de Junio. Los resultados de laboratorio se presentan en el Anexo 11.5.2. La mayoría de los pozos monitoreados cumplen con los valores establecidos en el Acuerdo 236-2006 para entes generadores nuevos y los valores en general se encuentran dentro del rango estadístico de la línea base.

Los valores de pH estuvieron en el rango de 6.22 a 7.51 u.e. y la temperatura en el rango de 19.2 a 34.3 °C. Las concentraciones registradas de Cloruros están por debajo de las directrices de la USEPA (250 mg/L).

En los pozos MW-5, MW-6 y MW-8, los valores registrados de sulfatos se encuentran por encima de los valores establecidos durante el levantamiento de línea base y por las guías de USEPA (250 mg/L). Todos los demás pozos se encuentran por debajo de las directrices que establece la USEPA.

Se reportaron valores de Sólidos Suspendidos Totales (**SST**) en los pozos MW7 y RW-1 los cuales se encuentran debajo de las guías establecidas por el Banco Mundial y el Acuerdo (50 y 100 mg/L respectivamente) y dentro de los rangos establecidos en la línea base.

El Berilio, Bismuto, Cadmio, Galio, Cromo, Cobalto, Cobre, Galio, Cromo Hexavalente, Mercurio, Molibdeno, Níquel, Plata, Talio, y Escandio no fueron detectados en ninguno de los pozos monitoreados.

El Antimonio se detectó en los pozos MW5, MW7, MW8, PSA-SR y HW-1 en concentraciones por debajo de la guía establecida por la USEPA (0.01 mg/L). El Bario fue detectado en todas las estaciones en concentraciones menores a la guía de la USEPA (1 mg/L).

El Hierro fue detectado en los pozos MW-7, MW-9, MW-11 y PSA-1. En los pozos MW-9, MW-11 y PSA-1 las concentraciones se encuentran por arriba de lo establecido por USEPA (0.3 mg/L). El Arsénico fue detectado en todas las estaciones de pozos de monitoreo y las concentraciones se encuentran dentro los mínimos y máximos establecidos en la línea base y por debajo de lo estipulado por la USEPA (0.01 mg/L). En ninguna estación de monitoreo fue detectado el cianuro total.

5 Sedimentos

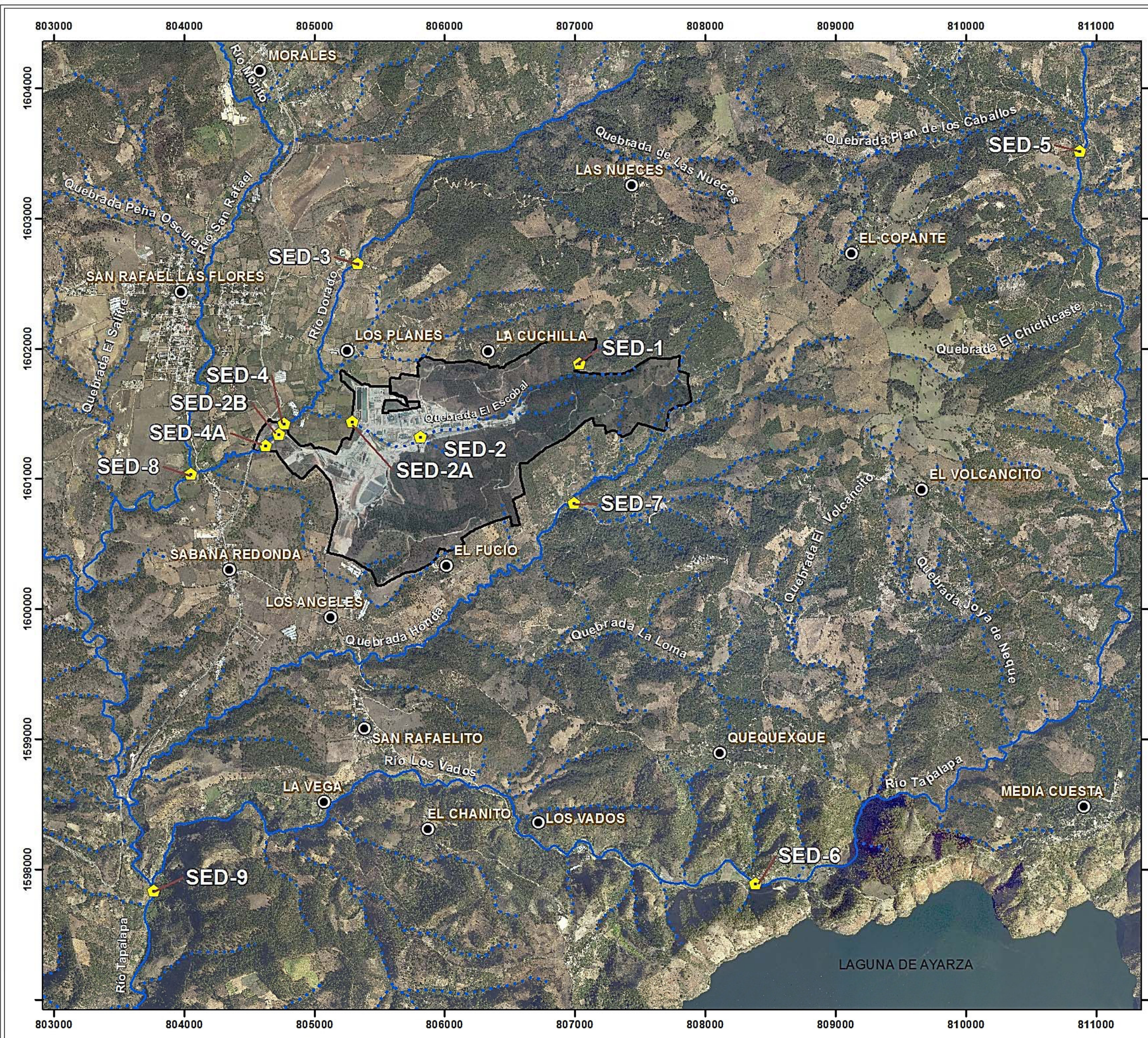
5.1 Sitios de Monitoreo

En el Cuadro 5-1 se enlistan las estaciones de monitoreo de sedimentos de las quebradas y ríos ubicados dentro o cercanas al área de influencia (AI) del Proyecto y su ubicación se presenta en la Figura 5-1.

Cuadro 5-1: Sitios de Monitoreo de Sedimento, Proyecto Minero Escobal


Estación	Coordenadas		Sitio
SED1	807,053	1,601,682	Quebrada El Escobal, aguas arriba del proyecto
SED2	805,811	1,601,164	Quebrada El Escobal, en medio del proyecto
SED2A	805,295	1,601,230	Quebrada El Escobal, Salida de la Propiedad
SED3	805,337	1,602,453	Río El Dorado, aguas arriba
SED4	804,781	1,601,228	Río El Dorado, aguas abajo
SED4A	804,629	1,601,052	Río El Dorado, por puente de acceso al Proyecto (Suandys)
SED5	810,882	1,603,313	Río Tapalapa, aguas arriba
SED6	808,391	1,597,689	Río Los Vados, aguas abajo
SED7	806,989	1,600,618	Quebrada La Honda
SED8	804,054	1,600,834	Unión Río San Rafael y El Dorado
SED9	803,772	1,597,635	Río Tapalapa, aguas abajo (cercano a la Ceibita)

Nota: en ninguna de las estaciones monitoreadas se cuenta con línea base de metales en sedimentos. Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO DE SEDIMENTOS





PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA




MINERA
SAN RAFAEL
DEPARTAMENTO DE AMBIENTE

Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984


LEYENDA

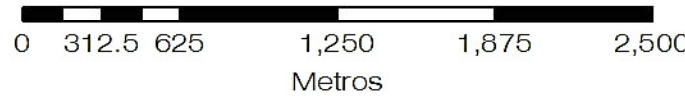
Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIONES DE MONITOREO

Símbolo	Estación	X	Y
	SED-1	807047	1601885
	SED-2	805805	1601367
	SED-2A	805289	1601433
	SED-2B	804728	1601341
	SED-3	805331	1602656
	SED-4	804775	1601431
	SED-4A	804623	1601255
	SED-5	810876	1603516
	SED-6	808385	1597892
	SED-7	806995	1600815
	SED-8	804048	1601037
	SED-9	803766	1597838

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 M ataquescuintla (2159-1) y Laguna de Ayarza (2159-II) del IGN, Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014, datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016	
Distancia Horizontal y Vertical de Grilla: 1,000 metros	
Escala 1:30,000	



0 312.5 625 1,250 1,875 2,500
Metros

5.2 Metodología

En el Cuadro 5-2 se describe los parámetros analizados en las muestras de sedimentos.

Cuadro 5-2: Parámetros analizados en sedimentos, Proyecto Minero Escobal

Parámetros utilizados	
Análisis	Metales Totales, Cianuro Total, Fósforo Total.
Laboratorio contratado	
Nombre	Las muestras fueron analizadas en el laboratorio ACZ, 2773 Downhill Drive Steamboat Springs, Colorado USA, el cual se encuentra acreditado y avalado por la USEPA

Fuente: MSR, 2016.

5.3 Resultados

En el Cuadro 5-3 se presenta los resultados de metales registrados para el mes de Junio de 2016. Los resultados del laboratorio se presentan en el Anexo 11.6.

El porcentaje de fósforo total se encuentra en el rango de 0.0075% (SED-7) a 0.0351% (SED-2). No se detectó cianuro en ninguna de las estaciones muestreadas.

El mercurio se detectó en todas las estaciones y en concentraciones por debajo de lo establecido (25 mg/kg) para la disposición de lodos en el suelo establecidos por el Acuerdo 236-2006. Las concentraciones de Cadmio y Cromo registradas están muy por debajo de los valores guía. Todas las estaciones muestreadas registraron concentraciones de Arsénico menor al valor sugerido (50 mg/Kg) a excepción de la estación SED-2.

Cuadro 5-3: Resultados de sedimentos, Proyecto Minero Escobal

Parámetro	Unidades	Acuerdo 236-2006	SED-1	SED-2	SED-2A	SED-3	SED-4	SED-4A
		Aplicación al suelo	Jun-16	Jun-16	Jun-16	Jun-16	Jun-16	Jun-16
Arsénico Total	mg/Kg**	50	8.1	64.3	33.1	18.2	17	12
Cadmio Total	mg/Kg**	50	0.16	25.6	8.38	0.18	0.17	0.2
Cromo Total	mg/Kg**	1500	1.8	13.6	8.7	2.5	3.3	2.7
Plomo Total	mg/Kg**	500	7.63	1490	466	7.33	8.5	10.2
Mercurio Total	mg/Kg**	25	0.11	0.7	0.23	0.15	0.11	0.13
Cianuro Total	mg/Kg**		<0.2	<0.5	<0.2	<0.2	<0.2	<0.2
Fósforo Total	%		0.0132	0.051	0.0349	0.0083	0.00765	0.0136

Parámetro	Unidades	Acuerdo 236-2006	SED-5	SED-6	SED-7	SED-8	SED-9
		Aplicación al suelo	Jun-16	Jun-16	Jun-16	Jun-16	Jun-16
Arsénico Total	mg/Kg**	50	6.8	13.6	4.4	17.9	4.8
Cadmio Total	mg/Kg**	50	0.26	0.16	0.10	0.35	0.26
Cromo Total	mg/Kg**	1500	3.2	10.6	1.7	2.7	3.1
Plomo Total	mg/Kg**	500	7.09	4.61	6.65	10.6	8.59
Mercurio Total	mg/Kg**	25	0.27	0.12	0.12	0.13	0.12
Cianuro Total	mg/Kg**		<0.2	<0.2	<0.2	<0.2	<0.2
Fósforo Total	%		0.00757	0.0106	0.0075	0.0301	0.013

mg/Kg: miligramo por kilogramo. ** mg/kg de materia seca a 104°C. %: porcentaje. *LMP para suelos con pH < 7 unidades, en los suelos que posean pH>7 se podrán disponer lodos hasta un 50% mayor de los valores presentados como LMP. Fuente: MSR, 2016.

6 Calidad de Efluentes

6.1 Sitios de Monitoreo

En el Cuadro 6-1 se describe la estación de monitoreo del efluente hacia la quebrada El Escobal, del agua proveniente de la planta de tratamiento de aguas especiales. Su ubicación se presenta en la Figura 6-1.

Cuadro 6-1: Sitio de Monitoreo de Calidad de Agua del Efluente de Planta de Tratamiento, Proyecto Minero Escobal

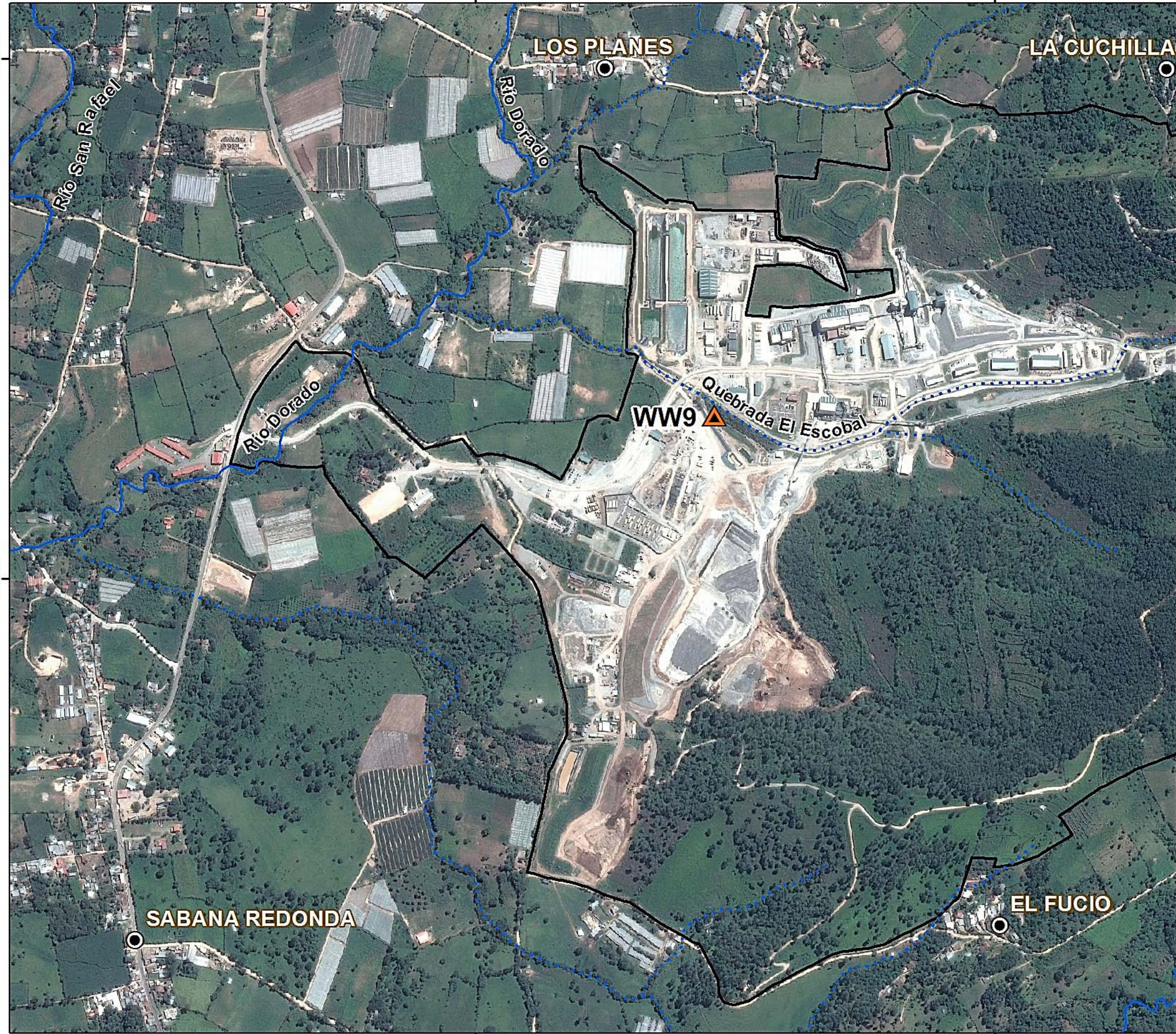
Estación	Coordenadas		Sitio
WW9	805,467	1,601,111	Dispositivo para toma de muestras de la planta de tratamiento de aguas residuales de tipo especial del proceso de minado.

Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2016.

805000 806000

1602000

1602000



805000 806000

1601000

MAPA DE LOCALIZACIÓN
ESTACIONES DE MONITOREO
EFLUENTES PLANTA DE TRATAMIENTO
DE AGUAS RESIDUALES

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



DEPARTAMENTO DE AMBIENTE
Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

ESTACIÓN DE MONITOREO

Símbolo	Estación	X	Y
	WW9	805461	1601314

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 Mataquesuintia (2159-1) y Laguna de Ayarza (2159-II) del IGN, Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014, datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016
Distancia Horizontal y Vertical de Grilla: 1,000 metros
Escala 1:8,000



6.2 Metodología

En el Cuadro 6-2 se describe el procedimiento y equipo utilizado para la toma de muestras de agua.

Cuadro 6-2: Procedimiento y equipo utilizado para medir parámetros *in situ* de muestras de agua residual, Proyecto Minero Escobal

Parámetros analizados	
<i>In Situ</i>	pH y temperatura
Laboratorio	Metales pesados Totales y Disueltos, Aceites y Grasas, DQO, DBO, Coliformes totales, Color, Sólidos Disueltos, Sólidos Sedimentables, Cianuro Total.
Procedimiento	
Basado en el procedimiento de toma de muestra dado por Water Management Consultants y el laboratorio ACZ para el análisis de Cianuro y en el procedimiento dado por <i>Standard Methods for the Examination of Water and Wastewater, part 1060 B</i> para los demás parámetros.	
Equipo utilizado	
Nombre	Automuestreador
Modelo	6712 Full-size con módulo integrado 701 para medición continua de pH y temperatura.
Fabricante	ISCO

Fuente: MSR, 2016.

Laboratorio empleado y valores de referencia: Las muestras de cianuro fueron analizadas en el laboratorio ACZ, 2773 Downhill Drive Steamboat Springs, Colorado USA, el cual se encuentra acreditado y avalado por la USEPA. Las muestras de agua residual fueron analizadas en el laboratorio Ecosistemas Proyectos Ambientales, S.A., laboratorio respaldado por un Sistema de Calidad ISO 17025, otorgado por la Oficina Guatemalteca de Acreditación (OGA); y con ello los análisis acreditados cuentan con validez internacional según OGA-LE 006-04.

6.3 Resultados

Durante los monitoreos correspondientes, se emplearon muestras control para determinar la confiabilidad de los resultados de parámetros analizados por el laboratorio encargado del análisis de las muestras. En total se efectuaron 3 muestras blanco y una muestra duplicado; los resultados obtenidos se presentan en el Cuadro 6-3.

Cuadro 6-3: Resultados de control de calidad para muestras de Efluentes de Planta de Tratamiento, Proyecto Minero Escobal

Mes	Unidades	LMP Acuerdo 236-2006	Mayo	Junio	Julio	Junio	
Control de Calidad			Blanco	Blanco	Blanco	Duplicado	Original
ID Muestra			WW10	WW10	WW10	WW11	WW9
No. Reporte Lab.			1062-16	1146-16	1326-16	1229-16	1227-16
Grasas y Aceites	mg/L	10	<5	<5	<5	<5	<5
Materia Flotante	NL	Ausente	ausente	ausente	ausente	ausente	ausente
DBO	mg/L	200	< 10	< 10	< 10	< 10	< 10
DQO		< 25	< 25	< 25	< 25	< 25	
SST (TSS)		100	< 10	< 10	< 10	<10	<10
Sólidos Sedimentables		< 0.1	< 0.1	< 0.1	<0.1	< 0.1	
Nitrógeno Total		20	<10	<10	<10	<10	<10
Fósforo Total		10	<0.05	<0.05	<0.05	<0.05	<0.05
Arsénico		0.1	<0.002	<0.002	<0.002	0.010	0.01
Cadmio		0.1	<0.02	<0.02	<0.02	<0.02	<0.02
Cobre		3	<0.03	<0.03	<0.03	<0.03	<0.03
Cromo Hexavalente		0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Cianuro Total*		1	<0.003	<0.003	<0.003	<0.003	<0.003
Mercurio		0.01	<0.004	<0.004	<0.004	<0.004	<0.004
Níquel		2	<0.05	<0.05	<0.05	<0.05	<0.05
Plomo		0.4	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc		10	<0.01	<0.01	<0.01	<0.01	<0.01
Color Aparente		u Pt/Co	500	< 1	< 1	< 1	< 1
Color Real	< 1			< 1	< 1	< 1	< 1
Coliformes Fecales	NMP/100ml	<1x10 ⁴	< 2	< 2	< 2	23	43

*análisis realizado por laboratorio AZC. u.e. unidades electroquímicas. °C: grados centígrados. mg/L: miligramos por litro. U Pt/Co: unidades de Platino-Cobalto. NMP/100ml: número más probable en 100 mililitros. NL = no hay límite establecido para este parámetro. Fuente: MSR, 2016.

Para la preparación de blancos analíticos de los parámetros fisicoquímicos y metales se utilizó agua desmineralizada y para los parámetros microbiológicos se utilizó agua salvavidas embotellada. Todos los parámetros analizados por los dos laboratorios son confiables en manipulación de las muestras y precisión del análisis.

En el Cuadro 6-4 se pueden observar los resultados de la calidad del efluente de la planta de tratamiento del Proyecto Minero Escobal. Los resultados de laboratorio se presentan en el Anexo 11.7.

Los valores de pH se encontraron en el rango de 7.19 a 7.31 u.e., cumpliendo con el rango establecido en el Acuerdo 6.0-9.0 u.e.

La concentración de Cianuro Total, Grasas y Aceites, Demanda Bioquímica de Oxígeno (**DBO**), Demanda Química de Oxígeno (**DQO**), sólidos sedimentables totales (**SST**), Arsénico Total, Plomo Total, Cadmio Total, Cobre Total, Cromo Hexavalente, Mercurio Total, Níquel Total y Coliformes fecales están por debajo de los valores establecidos por el acuerdo.

Por lo tanto los resultados obtenidos durante las descargas de la planta de tratamiento cumplen con el Acuerdo Gubernativo 236-2006 para entes generadores nuevos, Banco Mundial para el sector minero y la USEPA.

Cuadro 6-4: Calidad del Efluente de la Planta de Tratamiento, Proyecto Minero Escobal

Mes	Unidades	LMP Acuerdo 236-2006	Valores Indicador Banco Mundial Sector Minero	LMP EPA CFR 440, Subparte J, 440.102, (a)	Mayo	Junio	Julio
Fecha Muestreo					31/05/2016	27/06/2016	11/07/2016
ID Muestra					WW9	WW9	WW9
No. Reporte Lab.					1061-16	1227-16	1325-16
pH de campo	u.e.	6.0-9.0	6.0-9.0	6.0-9.0	7.25	7.19	7.31
Temperatura de campo	°C		+/- 3		25.9	26.9	25.8
Temperatura. Quebrada El Escobal					24.6	28.5	21.5
Grasas y Aceites	mg/L	10	10		<5	<5	<5
Materia Flotante		Ausente			ausente	ausente	ausente
DBO	mg/L	200	50		< 10	< 10	< 10
DQO			150		33	< 25	< 25
SST (TSS)		100	50	30	< 10	< 10	12
Sólidos Sedimentables					< 0.1	< 0.1	< 0.1
Nitrógeno Total		20	10		<10	<10	<10
Fósforo Total		10	2		<0.05	<0.05	<0.05
Arsénico		0.1	0.1		0.006	0.01	0.009
Cadmio		0.1	0.05		<0.02	<0.02	<0.02
Cobre		3	0.3	0.3	<0.03	<0.03	<0.03
Cromo Hexavalente		0.1	0.1		<0.05	<0.05	<0.05
Cianuro Total*		1	1		<0.003	<0.003	0.005
Mercurio		0.01	0.002	0.002	<0.004	<0.004	<0.004
Níquel		2	0.5		<0.05	<0.05	<0.05
Plomo		0.4	0.2	0.6	<0.05	<0.05	<0.05
Zinc		10	0.5	1.5	<0.01	<0.01	<0.01
Color Aparente		u Pt/Co	500			4	< 1
Color Real					< 1	< 1	< 1
Coliformes Fecales	NMP/100ml	<1x10⁴	400		940	43	49

u.e. unidades electroquímicas. °C: grados centígrados. mg/L: miligramos por litro. U Pt/Co: unidades de Platino-Cobalto. NMP/100ml: número más probable en 100 mililitros. *: análisis efectuados en laboratorio ACZ. Fuente: MSR, 2016.

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7 Vibraciones

7.1 Sitios de Monitoreo

La Empresa instaló tres equipos para la medición de vibraciones por medio del equipo eXPeak Seismograph modelo eXAD-8 de la empresa Physical Measurement Technologies, Inc. Estos equipos son automatizados y registran la velocidad (mm/s) y la frecuencia (Hz) de forma constante. La ubicación de las estaciones de monitoreo se presenta en la Figura 7-1 y en el Cuadro 7-1 se presenta la descripción de cada una de las estaciones.

Cuadro 7-1: Estaciones de monitoreo de vibraciones, Proyecto Minero Escobal

Estación	Coordenadas		Sitio
BS-1	806,424	1,601,608	Colindancia con Aldea La Cuchilla
BS-2	806,366	1,601,291	Entre ambos portales
BS-3	805,798	1,601,563	Depósito de Suelo

Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar.
Fuente: MSR, 2016.



MAPA DE LOCALIZACIÓN ESTACIONES DE MONITOREO DE VIBRACIONES PERMANENTE

PROYECTO MINERO ESCOBAL
SAN RAFAEL LAS FLORES, SANTA ROSA



Sistema de coordenadas: WGS 1984 UTM Zone 15N
Proyección: Transverse Mercator
Dato: WGS 1984

LEYENDA

Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Portal de Acceso
	Río Permanente
	Quebrada Intermittente

ESTACIONES DE MONITOREO

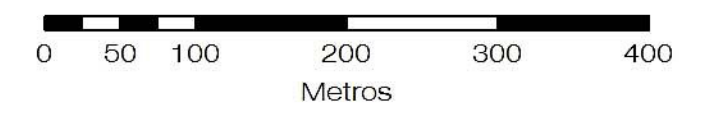
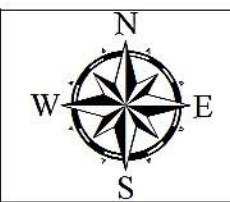
Símbolo	Estación	X	Y
	BS-1	806419	1601819
	BS-2	806361	1601492
	BS-3	805791	1601785

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000
Hojas catográficas año 2010 Mataquesuinta (2159-1) y Laguna de Ayarza (2159-II) del IGN,
Ortofotos año 2006 del MAGA y Fotografía aérea del proyecto el Escobal año 2014,
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Julio de 2016

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:5,000



7.2 Metodología

En el Cuadro 7-2 se describe el procedimiento y equipo utilizado para el registro de vibraciones.

Cuadro 7-2. Procedimiento y equipo utilizado para medir vibraciones, Proyecto Minero Escobal

PARAMETROS ANALIZADOS	
Velocidad	Velocidad de partícula
PROCEDIMIENTO	
Se registraron todas las voladuras realizadas en ambos portales durante los meses de mayo a julio de 2016. Y se enlistan las velocidades de partículas registrados por los equipos de vibraciones.	
EQUIPO UTILIZADO	
Equipo	eXPeak Seismograph modelo eXAD-8
Fabricante	Physical Measurement Technologies, Inc.

Fuente: MSR, 2016.

7.3 Resultados

En el Cuadro 7-3 se presentan todas las mediciones de las voladuras registradas en los instrumentos. Todos los resultados se encuentran por debajo del límite de detección del equipo (1.3 mm/s). Según la norma del United States Bureau of Mines, el límite a partir del cual las vibraciones inducidas por una voladura pueden ocasionar daños a estructuras es de 50.8 mm/s. Por lo que se puede determinar que las mismas no son sensibles y por lo tanto no representan un impacto para el ambiente.

Cuadro 7-3 Resultados de medición de vibraciones, Proyecto Minero Escobal

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1215-6540	1	06:00	<1.3
	1290-6890	1	06:05	<1.3
	1240-C.F.E.	1	06:10	<1.3
	1290-6770	1	06:15	<1.3
	1480-RAMPA	1	06:20	<1.3
	1340-6810	1	06:25	<1.3
	1480-C.F.O.	1	18:00	<1.3
	1480-7400	1	18:05	<1.3
	1290-6970	1	18:10	<1.3
	1265-6730	1	18:15	<1.3
	1215-6780	1	18:20	<1.3
	1365-6500	1	18:25	<1.3
	1430-C.F.E.	2	06:00	<1.3
	1290-6540	2	06:05	<1.3
	1365-6500	2	06:10	<1.3
	1190-6540	2	06:15	<1.3
	1240-6780	2	06:20	<1.3
	1290-6930	2	06:25	<1.3
	1265-6850	2	18:00	<1.3
	1240-6880	2	18:05	<1.3
	1215-6540	2	18:10	<1.3
	1340-6810	2	18:15	<1.3
	1240-6940	3	06:00	<1.3
	1240-6890	3	06:05	<1.3
1455-7440	3	06:10	<1.3	
1290-6770	3	06:15	<1.3	
1390-6860	3	18:00	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1430-C.F.E.	3	18:05	<1.3
	1480-C.F.E.	3	18:10	<1.3
	1190-6540	3	18:15	<1.3
	1290-6450	3	18:20	<1.3
	1290-6950	4	06:00	<1.3
	1480-c.f.o.	4	06:05	<1.3
	1480-7400	4	06:10	<1.3
	1340-6810	4	06:15	<1.3
	1290-6550	4	06:20	<1.3
	1365-6500	4	06:25	<1.3
	1215-6780	4	18:00	<1.3
	1240-c.f.e.	4	18:05	<1.3
	1290-6970	4	18:10	<1.3
	1480-rampa	4	18:15	<1.3
	1215-6540	4	18:20	<1.3
	1240-6780	5	06:00	<1.3
	1340-6630	5	06:05	<1.3
	1315-6730	5	06:10	<1.3
	1455-SERV.	5	06:15	<1.3
	1390-6860	5	06:20	<1.3
	1430-7480	5	18:00	<1.3
	1315-6850	5	18:05	<1.3
	1190-6540	5	18:10	<1.3
	1240-6940	5	18:15	<1.3
1480-C.F.E.	5	18:20	<1.3	
1290-6550	6	06:00	<1.3	
1340-6810	6	06:05	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1480-RAMPA	6	06:10	<1.3
	1480-C.F.O.	6	06:15	<1.3
	1480-7400	6	06:20	<1.3
	1240-6930	6	18:00	<1.3
	1455-SERVICIOS	6	18:05	<1.3
	1390-6860	6	18:10	<1.3
	1240-C.F.E.	6	18:15	<1.3
	1240-6610	7	06:00	<1.3
	1340-6630	7	06:05	<1.3
	1480-C.F.E.	7	06:10	<1.3
	1190-6540	7	06:15	<1.3
	1315-6730	7	18:00	<1.3
	1215-6540	7	18:05	<1.3
	1340-6810	7	18:10	<1.3
	1240-6480	8	06:00	<1.3
	1190-6540	8	06:05	<1.3
	1430-7480	8	06:10	<1.3
	1290-6560	8	18:00	<1.3
	1480-7400	8	18:05	<1.3
	1430-7480	8	18:10	<1.3
	1240-6940	8	18:15	<1.3
	1290-6730	8	18:20	<1.3
	1480-SERV.	9	06:00	<1.3
	1240-C.F.E.	9	06:05	<1.3
	1480-C.F.O.	9	06:10	<1.3
	1480-RAMPA	9	06:15	<1.3
	1455-7440	9	06:20	<1.3
	1315-6850	9	18:00	<1.3
	1390-6880	9	18:05	<1.3
	1480-RMUCK	9	18:10	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1365-6780	9	18:15	<1.3
	1430-7480	10	06:00	<1.3
	1215-6540	10	06:05	<1.3
	1240-6780	10	06:10	<1.3
	1390-6860	10	18:00	<1.3
	1480-C.F.E.	10	18:05	<1.3
	1190-6540	11	06:00	<1.3
	1190-6420	11	06:05	<1.3
	1340-6810	11	06:10	<1.3
	1430-C.F.E.	11	06:15	<1.3
	1455-SERV.	11	06:20	<1.3
	1480-7400	11	18:00	<1.3
	1290-6550	11	18:05	<1.3
	1390-6880	11	18:10	<1.3
	1480-SERV.	11	18:15	<1.3
	1290-6730	11	18:20	<1.3
	1290-6970	12	06:00	<1.3
	1240-6780	12	06:05	<1.3
	1215-6420	12	06:10	<1.3
	1480-RAMPA	12	06:15	<1.3
	1480-RMUCK	12	06:20	<1.3
	1290-6730	12	06:25	<1.3
	1190-6920	12	18:00	<1.3
	1215-6540	12	18:05	<1.3
	1240-6940	12	18:10	<1.3
	1340-6810	12	18:15	<1.3
	1340-6700	12	18:20	<1.3
	1430-7480	13	06:00	<1.3
	1315-6850	13	06:05	<1.3
	1390-C.F.O.	13	06:10	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1390-6860	13	06:15	<1.3
	1340-6780	13	06:20	<1.3
	1340-6560	13	06:25	<1.3
	1430-7380	13	18:00	<1.3
	1455-SERV	13	18:05	<1.3
	1290-6550	13	18:10	<1.3
	1480-7400	13	18:15	<1.3
	1240-C.F.E.	13	18:20	<1.3
	1480-C.F.O.	13	18:25	<1.3
	1340-6810	14	06:00	<1.3
	1240-6780	14	06:05	<1.3
	1480-RMUCK	14	06:10	<1.3
	1480-7400	14	06:15	<1.3
	1215-TALLER	14	06:20	<1.3
	1365-6780	14	06:25	<1.3
	1315-6630	14	06:30	<1.3
	1190-6420	14	18:00	<1.3
	1430-7480	14	18:05	<1.3
	1315-6850	14	18:10	<1.3
	1315-6620	14	18:15	<1.3
	1315-6630	14	18:20	<1.3
	1455-7380	15	06:00	<1.3
	1240-6940	15	06:05	<1.3
	1215-6420	15	06:10	<1.3
	1390-6860	15	06:15	<1.3
	1455-SERV	15	06:20	<1.3
	12156-6540	15	18:00	<1.3
	1240-6780	15	18:05	<1.3
1390-6880	15	18:10	<1.3	
1480-SERV	15	18:15	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1315-6630	15	18:20	<1.3
	1480-RMUCK	16	06:00	<1.3
	1480-7400	16	06:05	<1.3
	1480-C.F.O.	16	06:10	<1.3
	1340-6730	16	18:00	<1.3
	1340-6810	16	18:05	<1.3
	1340-C.F.E.	16	18:10	<1.3
	1390-C.F.O.	16	18:15	<1.3
	1365-6860	16	18:20	<1.3
	1455-7440	16	18:25	<1.3
	1390-6860	17	06:00	<1.3
	1240-6780	17	06:05	<1.3
	1340-6700	17	06:10	<1.3
	1315-6630	17	06:15	<1.3
	1215-6540	17	18:00	<1.3
	1390-6880	17	18:05	<1.3
	1290-6410	17	18:10	<1.3
	1190-6420	18	06:00	<1.3
	1215-6420	18	06:05	<1.3
	1430-C,F,E,	18	06:10	<1.3
	1455-SERV.	18	06:15	<1.3
	1455-C,F,E,	18	06:20	<1.3
	1455-7380	18	06:25	<1.3
	1480-C.F.O.	18	18:00	<1.3
	1480-7400	18	18:05	<1.3
	1240-6780	18	18:10	<1.3
	1365-C.F.E.	18	18:15	<1.3
	1265-6750	18	18:20	<1.3
	1365-6780	18	18:25	<1.3
	1340-6810	19	06:00	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1480-SERV.	19	06:05	<1.3
	1480-RAMPA	19	06:10	<1.3
	1455-C.F.E.	19	06:15	<1.3
	1365-6860	19	18:00	<1.3
	1215-6420	19	18:05	<1.3
	1240-C.F.E.	19	18:10	<1.3
	1240-6960	19	18:15	<1.3
	1190-6420	20	06:00	<1.3
	1390-6860	20	06:05	<1.3
	1390-6880	20	06:10	<1.3
	1390-c.f.o.	20	06:15	<1.3
	1340-6730	20	18:00	<1.3
	1340-6810	20	18:05	<1.3
	1190-6780	20	18:10	<1.3
	1455-SERV	20	18:15	<1.3
	1480-C.F.O.	20	18:20	<1.3
	1480-6400	20	18:25	<1.3
	1315-6630	20	18:30	<1.3
	1215-6420	21	06:00	<1.3
	1240-6780	21	06:05	<1.3
	1480-SERV.	21	06:10	<1.3
	1365-C.F.E.	21	06:15	<1.3
	1240-C.F.O.	21	06:20	<1.3
	1430-C.F.E.	21	18:00	<1.3
	1190-6420	21	18:05	<1.3
	1480-RAMPA	21	18:10	<1.3
	1455-C.F.E.	21	18:15	<1.3
	1365-6780	21	18:20	<1.3
1340-6810	21	18:25	<1.3	
1480-C.F.O.	21	18:30	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1240-C.F.O.	22	06:00	<1.3
	1240-C.F.E.	22	06:05	<1.3
	1290-6510	22	06:10	<1.3
	1480-7400	22	18:00	<1.3
	1390-C.F.E.	22	18:05	<1.3
	1390-C.F.O.	22	18:10	<1.3
	1390-6880	22	18:15	<1.3
	1290-6400	22	18:20	<1.3
	1340-6700	22	18:25	<1.3
	1390-6860	23	06:00	<1.3
	1430-C.F.E.	23	06:05	<1.3
	1190-6420	23	06:10	<1.3
	1455-C.F.E.	23	18:00	<1.3
	1365-C.F.E.	23	18:05	<1.3
	1480-RAMPA	23	18:10	<1.3
	1340-6730	23	18:15	<1.3
	1365-6750	23	18:20	<1.3
	1240-6960	24	06:00	<1.3
	1240-6780	24	06:05	<1.3
	1240-c.f.e.	24	06:10	<1.3
	1480-c.f.o.	24	18:00	<1.3
	1390-6880	24	18:05	<1.3
	1340-6810	25	06:00	<1.3
	1290-6510	25	06:05	<1.3
	1215-6420	25	06:10	<1.3
	1190-6420	25	06:15	<1.3
	1215-6780	25	06:20	<1.3
	1390-c.f.e.	25	18:00	<1.3
	1455-c.f.e.	25	18:05	<1.3
	1480-7400	25	18:10	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1265-6850	25	18:15	<1.3
	1480-C.F.O.	26	06:00	<1.3
	1480-C,F,E,	26	06:05	<1.3
	1390-C.F.O.	26	06:10	<1.3
	1390-6880	26	06:15	<1.3
	1215-6780	26	18:00	<1.3
	1290-6410	26	18:05	<1.3
	1340-6730	26	18:10	<1.3
	1480-RAMPA	26	18:15	<1.3
	1190-6420	26	18:20	<1.3
	1340-6810	27	06:00	<1.3
	1240-6780	27	06:05	<1.3
	1215-6420	27	06:10	<1.3
	1455-cf/o	27	06:15	<1.3
	1340-6500	27	06:20	<1.3
	1365-6500	27	18:00	<1.3
	1390-6860	27	18:05	<1.3
	1265-6750	27	18:10	<1.3
	1240-6960	27	18:15	<1.3
	1190-6420	27	18:20	<1.3
	1480-7400	27	18:25	<1.3
	1340-6580	27	18:30	<1.3
	1290-6410	28	06:00	<1.3
	1455-7380	28	06:05	<1.3
	1480-CF-E	28	06:10	<1.3
	1240-CF/O	28	06:15	<1.3
	1290-6510	28	06:20	<1.3
	1490-7440	28	06:25	<1.3
1480 CF-E	28	06:30	<1.3	
1390-CF/E	28	18:00	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1390-CF/O	28	18:05	<1.3
	1390-6880	28	18:10	<1.3
	1240-6780	28	18:15	<1.3
	1240-6610	28	18:20	<1.3
	1215-6420	29	06:00	<1.3
	1240-6960	29	06:05	<1.3
	1480-RAMPA	29	06:10	<1.3
	1480-7400	29	06:15	<1.3
	1365-6500	29	06:20	<1.3
	1190-6420	29	18:00	<1.3
	1290-6510	29	18:05	<1.3
	1365-V	29	18:10	<1.3
	1480-CF-O	29	18:15	<1.3
	1455-DESG	29	18:20	<1.3
	1430-DESG	29	18:25	<1.3
	1290-6410	30	06:00	<1.3
	1265-6750	30	06:05	<1.3
	1340-6810	30	06:10	<1.3
	1390-CF/O	30	06:15	<1.3
	1390-6860	30	06:20	<1.3
	1190-6420	30	18:00	<1.3
	1340-6730	30	18:05	<1.3
	1480-7420	30	18:10	<1.3
	1340-CF/ESTE	30	18:15	<1.3
	1480-RAMPA	30	18:20	<1.3
	1240-6960	31	06:00	<1.3
	1480-CF/O	31	06:05	<1.3
	1455-VEN	31	06:10	<1.3
	1390-6880	31	06:15	<1.3
	1240-VENT	31	18:00	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Mayo	1365-VENT	31	18:05	<1.3
Junio	1265-6750	1	06:00	<1.3
	1265-6780	1	06:05	<1.3
	1480-7440	1	06:10	<1.3
	1480-CF/ESTE	1	06:15	<1.3
	1480-CF/OESTE	1	06:20	<1.3
	1365-6500	1	06:25	<1.3
	1480-RAMPA	1	18:00	<1.3
	1390-6860	1	18:05	<1.3
	1190-6420	1	18:10	<1.3
	1290-6510	2	06:00	<1.3
	1455-VENT	2	06:05	<1.3
	1480-7400	2	06:10	<1.3
	1390-CF/O	2	06:15	<1.3
	1430-VENT	2	06:20	<1.3
	1340-6730	2	18:00	<1.3
	1340-6810	2	18:05	<1.3
	1480-RAMPA	2	18:10	<1.3
	1290-6810	2	18:15	<1.3
	1365-6700	2	18:20	<1.3
	1455-7500	3	06:00	<1.3
	1265-6750	3	06:05	<1.3
	1390-CF/ESTE	3	06:10	<1.3
	1390-6840	3	06:15	<1.3
	1290-6810	3	06:20	<1.3
	1480-CF/ESTE	3	18:00	<1.3
	1480-7400	3	18:05	<1.3
	1365-6700	3	18:10	<1.3
	1480-CF/OESTE	4	06:00	<1.3
1480-7440	4	06:05	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1390-6880	4	06:10	<1.3
	1215-6420	4	06:15	<1.3
	1190-6420	4	06:20	<1.3
	1290-6410	4	06:25	<1.3
	1340-6810	4	18:00	<1.3
	1365-VENT	4	18:05	<1.3
	1340-6730	4	18:10	<1.3
	1480-RAMPA	4	18:15	<1.3
	1290-6510	5	06:00	<1.3
	1190-6830	5	06:05	<1.3
	1455-VENTI	5	06:10	<1.3
	1455-7500	5	06:15	<1.3
	1290-6850PROD	5	06:20	<1.3
	1480-CF/OESTE	5	18:00	<1.3
	1390-CF/ESTE	5	18:05	<1.3
	1190-6420	5	18:10	<1.3
	1355-RAMPA	6	06:00	<1.3
	1290-6510	6	06:05	<1.3
	1455-VENT	6	06:10	<1.3
	1480-7400	6	06:15	<1.3
	1215-6810 PROD	6	06:20	<1.3
	1340-6730	6	18:00	<1.3
	1215-6420	6	18:05	<1.3
	1240-6780	6	18:10	<1.3
	1340-6810	6	18:15	<1.3
	1290-CFESTE	6	18:20	<1.3
	1390-6880	7	06:00	<1.3
	1390-C/F ESTE	7	06:05	<1.3
	1390-6860	7	06:10	<1.3
	1480-C/ESTE	7	06:15	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1355-RAMPA	7	06:20	<1.3
	1365-6500 PROD	7	06:25	<1.3
	1315-6810 PROD	7	06:30	<1.3
	1455-VENT	7	18:00	<1.3
	1240-CF/ESTE	7	18:05	<1.3
	1240-VENT	7	18:10	<1.3
	1315-6810 PROD	7	18:15	<1.3
	1190-6420	8	06:00	<1.3
	1265-6750	8	06:05	<1.3
	1480-RAMPA	8	06:10	<1.3
	1390-VENT	8	06:15	<1.3
	1480-CFTO	8	18:00	<1.3
	1290-6510	8	18:05	<1.3
	1455-7500	8	18:10	<1.3
	1480-7400	8	18:15	<1.3
	1315-6810	8	18:20	<1.3
	1390-cf/o	9	06:00	<1.3
	1480-7440	9	06:05	<1.3
	1240-6780	9	06:10	<1.3
	1215-6420	9	06:15	<1.3
	1390-6880	9	18:00	<1.3
	1340-6730	9	18:05	<1.3
	1480-7460	9	18:10	<1.3
	1265-6750	9	18:15	<1.3
	1390-6860	9	18:20	<1.3
	1430-VENT	9	18:25	<1.3
	1365-6700 PROD	9	18:30	<1.3
	1355-SUMID	10	06:00	<1.3
1480-RAMPA	10	06:05	<1.3	
1240-6980	10	06:10	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1455-7500	10	06:15	<1.3
	1240-VENT	10	06:20	<1.3
	1190-6420	10	18:00	<1.3
	1390-VENT	10	18:05	<1.3
	1480-C/F	10	18:10	<1.3
	1340-6580	10	18:15	<1.3
	1390-CFTO	11	06:00	<1.3
	1390-6840	11	06:05	<1.3
	1455-7500	11	06:10	<1.3
	1480-RAMPA	11	06:15	<1.3
	1365-6700 PROD	11	06:20	<1.3
	1240-6780	11	18:00	<1.3
	1390-6880	11	18:05	<1.3
	1480-7400	11	18:10	<1.3
	1480-SERV	11	18:15	<1.3
	1215-6420	12	06:00	<1.3
	1190-6420	12	06:05	<1.3
	1390-6860	12	06:10	<1.3
	1240-6440 PROD	12	06:15	<1.3
	1480-VENT	12	18:00	<1.3
	1355-SUMIDERO	12	18:05	<1.3
	1390-VENTI	12	18:10	<1.3
	1240-VENTI	12	18:15	<1.3
	1290-6730	13	06:00	<1.3
	1355-SUMID	13	06:05	<1.3
	1480-7460	13	06:10	<1.3
	1355-VENT	13	06:15	<1.3
	1430-7500	13	06:20	<1.3
	1355-SUMID	13	18:00	<1.3
	1340-6580	13	18:05	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1480-VENT	13	18:10	<1.3
	1390-6880	13	18:15	<1.3
	1240-6560	14	06:00	<1.3
	1340-6840	14	06:05	<1.3
	1340-cfto	14	06:10	<1.3
	1480-RAMPA	14	06:15	<1.3
	1415-SUMID	14	06:20	<1.3
	1240-6440 PROD	14	06:25	<1.3
	1315-6810 PROD	14	06:30	<1.3
	1455-7340	14	18:00	<1.3
	1480-VENT	14	18:05	<1.3
	1215-6420	14	18:10	<1.3
	1290-SUMIDERO	14	18:15	<1.3
	1240-6560	15	06:00	<1.3
	1340-6840	15	06:05	<1.3
	1340-cfto	15	06:10	<1.3
	1480-RAMPA	15	06:15	<1.3
	1415-SUMID	15	06:20	<1.3
	1240-6440 PROD	15	06:25	<1.3
	1315-6810 PROD	15	06:30	<1.3
	1455-7340	15	18:00	<1.3
	1480-VENT	15	18:05	<1.3
	1215-6420	15	18:10	<1.3
	1290-SUMIDERO	15	18:15	<1.3
	1240-VENT	16	06:00	<1.3
	1240-6930	16	06:05	<1.3
	1340-6730	16	06:10	<1.3
	1240-6560	16	06:15	<1.3
	1480-RAMPA	16	06:20	<1.3
	1365-6580	16	06:25	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1240-6440	16	06:30	<1.3
	1265-6750	16	18:00	<1.3
	1480-6420	16	18:05	<1.3
	1480-VENT	16	18:10	<1.3
	1430-VENT	16	18:15	<1.3
	1430-7500	16	18:20	<1.3
	1265-6800 REQ	16	18:25	<1.3
	1480-7420	17	06:00	<1.3
	1315-6730	17	06:05	<1.3
	1265-6470	17	06:10	<1.3
	1430-7420	17	06:15	<1.3
	1390-cfto	17	06:20	<1.3
	1240-6540	17	18:00	<1.3
	1455-6340	17	18:05	<1.3
	1215-6420	17	18:10	<1.3
	1315-6890	18	06:00	<1.3
	1265-6790	18	06:05	<1.3
	1240-6980	18	06:10	<1.3
	1240-VENT	18	06:15	<1.3
	1390-6840	18	06:20	<1.3
	1480-VENT	18	06:25	<1.3
	1265-6750	18	18:00	<1.3
	1290-SUMID	18	18:05	<1.3
	1430-7500	18	18:10	<1.3
	1430-VENT	18	18:15	<1.3
	1365-6580	18	18:20	<1.3
	1480-RAMPA	19	06:00	<1.3
	1480-7420	19	06:05	<1.3
	1480-VENT	19	06:10	<1.3
	1315-6890	19	18:00	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1215-6420	19	18:05	<1.3
	1340-6730	19	18:10	<1.3
	1455-7340	19	18:15	<1.3
	1240-6560	19	18:20	<1.3
	1240-VENT	20	06:00	<1.3
	1240-6980	20	06:05	<1.3
	1390-CFTO	20	06:10	<1.3
	1265-6750	20	06:15	<1.3
	1365-6580	20	18:00	<1.3
	1480-7500	20	18:05	<1.3
	1480-VENT	20	18:10	<1.3
	1390-6880	20	18:15	<1.3
	1480-7460	20	18:20	<1.3
	1265-6790	21	06:00	<1.3
	1480-7420	21	06:05	<1.3
	1480-RAMPA	21	06:10	<1.3
	1265-6470	21	06:15	<1.3
	1390-VEN, PROD	21	06:20	<1.3
	1315-6780	21	18:00	<1.3
	1240-6560	21	18:05	<1.3
	1315-6890	21	18:10	<1.3
	1455-7340	21	18:15	<1.3
	1480-CFTO	22	06:00	<1.3
	1340-6850	22	06:05	<1.3
	1265-6750	22	06:10	<1.3
	1240-CFTO	22	06:15	<1.3
1480-7460	22	18:00	<1.3	
1265-6470	22	18:05	<1.3	
1340-6730	22	18:10	<1.3	
1480-VENT	22	18:15	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1315-6890	23	06:00	<1.3
	1240-6560	23	06:05	<1.3
	1480-7420	23	06:10	<1.3
	1480-RAMPA	23	06:15	<1.3
	1430-7340	23	18:00	<1.3
	1455-7340	23	18:05	<1.3
	1240-VENT	23	18:10	<1.3
	1265-6790	23	18:15	<1.3
	1215-6420	23	18:20	<1.3
	1365-6580	24	06:00	<1.3
	1315-6890	24	06:05	<1.3
	1240-CF	24	06:10	<1.3
	1480-VENT	24	06:15	<1.3
	1265-6470	24	06:20	<1.3
	1480-1440	24	06:25	<1.3
	1265-6790	24	18:00	<1.3
	1340-6760	24	18:05	<1.3
	1340-6730	24	18:10	<1.3
	1480-RAMPA	25	06:00	<1.3
	1240-6560	25	06:05	<1.3
	1430-7340	25	06:10	<1.3
	1365-6760	25	06:15	<1.3
	1340-6540	25	18:00	<1.3
	1240-CFTO	25	18:05	<1.3
	1480-7420	25	18:10	<1.3
	1480-CFTO	25	18:15	<1.3
1480-VENT	25	18:20	<1.3	
1365-6540	26	06:00	<1.3	
1265-6470	26	06:05	<1.3	
1265-6790	26	06:10	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Junio	1315-6890	26	06:15	<1.3
	1215-6420	26	06:20	<1.3
	1240-6560	26	18:00	<1.3
	1340-6730	26	18:05	<1.3
	1480-7380	27	06:00	<1.3
	1480-7360	27	06:05	<1.3
	1480-cfte	27	06:10	<1.3
	1365-6540 PROD	27	06:15	<1.3
	1240-CFTO	27	18:00	<1.3
	1340-6490	27	18:05	<1.3
	1480-7420	27	18:10	<1.3
	1365-6760 PROD	27	18:15	<1.3
	1480-RAMPA	28	06:00	<1.3
	1315-6890	28	06:05	<1.3
	1215-6780	28	06:10	<1.3
	1365-6580	28	18:00	<1.3
	1340-6490	28	18:05	<1.3
	1240-6560	29	06:00	<1.3
	1265-6790	29	06:05	<1.3
	1265-6470	29	06:10	<1.3
	1340-6850	29	06:15	<1.3
	1340-6069	29	06:20	<1.3
	1480-7440	29	06:25	<1.3
	1365-6580	29	06:30	<1.3
	1315-6890	29	18:00	<1.3
	1240-CFTO	29	18:05	<1.3
	1480-7420	29	18:10	<1.3
	1480-7380	29	18:15	<1.3
	1340-6960	30	06:00	<1.3
	1340-6730	30	06:05	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)	
Junio	1340-6490	30	06:10	<1.3	
	1480-RAMPA	30	06:15	<1.3	
	1240-6560	30	06:20	<1.3	
	1365-6540	30	06:25	<1.3	
	1265-6470	30	18:00	<1.3	
	1480-CF/E	30	18:05	<1.3	
	1390-CF/O	30	18:10	<1.3	
	1340-6850	30	18:15	<1.3	
	Julio	1315-6890	1	06:00	<1.3
		1265-6790	1	06:05	<1.3
1480-7420		1	06:10	<1.3	
1480-RAMPA		1	06:15	<1.3	
1365-6760		1	06:20	<1.3	
1215-6360		1	18:00	<1.3	
1240-6560		1	18:05	<1.3	
1480-7380		1	18:10	<1.3	
1480-C/F.E.		1	18:15	<1.3	
1480-7440		2	06:00	<1.3	
1480-7420		2	06:05	<1.3	
1240-cfto		2	06:10	<1.3	
1265-7460		2	06:15	<1.3	
1390-6850		2	06:20	<1.3	
1480-SERV		2	06:25	<1.3	
1480-RAMPA		2	18:00	<1.3	
1315-6890		2	18:05	<1.3	
1265-6790		2	18:10	<1.3	
1340-6730		2	18:15	<1.3	
1365-PORT		2	18:20	<1.3	
1430-7340	3	06:00	<1.3		
1240-6560	3	06:05	<1.3		

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1390-CFTO	3	06:10	<1.3
	1315-6630	3	06:15	<1.3
	1340-6440	3	06:20	<1.3
	1455-7420	3	06:25	<1.3
	1340-6730	3	18:00	<1.3
	1365-6540	3	18:05	<1.3
	1190-6790	3	18:10	<1.3
	1240-CFTO	3	18:15	<1.3
	1480-7380	3	18:20	<1.3
	1480-6720	4	06:00	<1.3
	1315-6890	4	06:05	<1.3
	1390-6860	4	06:10	<1.3
	1340-6960	4	06:15	<1.3
	1480-7440	4	06:20	<1.3
	1480-7480	4	06:25	<1.3
	1340-6490	4	18:00	<1.3
	1480-RAMPA	4	18:05	<1.3
	1240-CFTO	4	18:10	<1.3
	1190-6740	5	06:00	<1.3
	1265-6470	5	06:05	<1.3
	1480-7440	5	06:10	<1.3
	1480-7480	5	06:15	<1.3
	1455-7420	5	06:20	<1.3
	1430-7340	5	18:00	<1.3
	1390-CFTO	5	18:05	<1.3
	1340-6730	5	18:10	<1.3
	1480-7400	6	06:00	<1.3
	1315-6890	6	06:05	<1.3
1340-6890	6	06:10	<1.3	
1240-CFTO	6	06:15	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1265-6790	6	06:20	<1.3
	1240-6560	6	18:00	<1.3
	1190-6900	6	18:05	<1.3
	1290-7100	6	18:10	<1.3
	1480-RAMPA	6	18:15	<1.3
	1455-VENT	6	18:20	<1.3
	1265-6470	6	18:25	<1.3
	1480-7420	6	18:30	<1.3
	1480-7480	7	06:00	<1.3
	1340-6490	7	06:05	<1.3
	1190-6790	7	06:10	<1.3
	1480-CFTE	7	06:15	<1.3
	1455-7420	7	06:20	<1.3
	1480-7420	7	18:00	<1.3
	1480-7440	7	18:05	<1.3
	1265-6476	7	18:10	<1.3
	1265-6790	7	18:15	<1.3
	1480-SERVI	7	18:20	<1.3
	1240-6780	8	06:00	<1.3
	1390-6860	8	06:05	<1.3
	1240-CFTO	8	06:10	<1.3
	1390-CFTO	8	06:15	<1.3
	1240-6560	8	06:20	<1.3
	1315-6890	8	06:25	<1.3
	1430-7340	8	06:30	<1.3
	1455-SERV	8	18:00	<1.3
	1290-7100	8	18:05	<1.3
	1190-6790	8	18:10	<1.3
	1480-7480	8	18:15	<1.3
	1480-RAMPA	9	06:00	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1340-6490	9	06:05	<1.3
	1265-6470	9	06:10	<1.3
	1265-6790	9	06:15	<1.3
	1390-6860 PROD	9	06:20	<1.3
	1455-SERV	9	18:00	<1.3
	1240-6560	9	18:05	<1.3
	1480-CFTE	9	18:10	<1.3
	1480-7440	9	18:15	<1.3
	1190-6900	9	18:20	<1.3
	1240-CFTO	10	06:00	<1.3
	1190-6790	10	06:05	<1.3
	1340-6490	10	06:10	<1.3
	1240-6780	10	18:00	<1.3
	1480-7480	10	18:05	<1.3
	1390-CFTO	10	18:10	<1.3
	1265-6470	10	18:15	<1.3
	1480-RAMPA	11	06:00	<1.3
	1480-7420	11	06:05	<1.3
	1190-6900	11	06:10	<1.3
	1290-7100	11	06:15	<1.3
	1390-6860	11	06:20	<1.3
	1240-6560	11	18:00	<1.3
	1240-CFTO	11	18:05	<1.3
	1480-CFTO	11	18:10	<1.3
	1265-6790	12	06:00	<1.3
	1315-6960	12	06:05	<1.3
	1240-6780	12	18:00	<1.3
	1490-6770	12	18:05	<1.3
	1480-7420	12	18:10	<1.3
	1480-7440	12	18:15	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1190-6790	13	06:00	<1.3
	1215-6900	13	06:05	<1.3
	1265-7470	13	06:10	<1.3
	1315-6770	13	06:15	<1.3
	1390-6880	13	18:00	<1.3
	1340-6770	13	18:05	<1.3
	1240-6560	13	18:10	<1.3
	1290-7100	13	18:15	<1.3
	1340-6490	13	18:20	<1.3
	1190-6790	14	06:00	<1.3
	1190-6900	14	06:05	<1.3
	1265-6770	14	06:10	<1.3
	1215-6900	14	18:00	<1.3
	1240-CFTO	14	18:05	<1.3
	1390-6840	14	18:10	<1.3
	1480-7440	14	18:15	<1.3
	1265-6470	14	18:20	<1.3
	1190-6900	15	06:00	<1.3
	1290-7100	15	06:05	<1.3
	1340-6490	15	06:10	<1.3
	1390 C/F.O.	15	06:15	<1.3
	1480-7420	15	18:00	<1.3
	1505-Rampa	15	18:05	<1.3
	1265-6790	15	18:10	<1.3
	1265-6470	15	18:15	<1.3
	1190-6900	16	06:00	<1.3
	1290-7100	16	06:05	<1.3
	1340-6490	16	06:10	<1.3
	1390 C/F.O.	16	06:15	<1.3
	1480-7360	16	18:00	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1190-6900	16	18:05	<1.3
	1190-6790	16	18:10	<1.3
	1430-7440	16	18:15	<1.3
	1505-RAMPA	17	06:00	<1.3
	1340-6770	17	06:05	<1.3
	1265-6790	17	06:10	<1.3
	1265-6470	17	06:15	<1.3
	1240-6440	17	06:20	<1.3
	1480-7420	17	18:00	<1.3
	1215-6900	17	18:05	<1.3
	1190-6540	17	18:10	<1.3
	1390-6840	17	18:15	<1.3
	1190-6900	18	06:00	<1.3
	1480-7360	18	06:05	<1.3
	1265-6790	18	06:10	<1.3
	1340-6490	18	06:15	<1.3
	1240-6560	18	18:00	<1.3
	1265-6470	18	18:05	<1.3
	1190-6420	18	18:10	<1.3
	1390-6880	18	18:15	<1.3
	1505-RAMPA	19	06:00	<1.3
	1480-7420	19	06:05	<1.3
	1340-6770	19	06:10	<1.3
	1480-7440	19	06:15	<1.3
	1480-VENT	19	18:00	<1.3
	1240-6460	19	18:05	<1.3
	1240-CFTO	19	18:10	<1.3
	1480-7360	19	18:15	<1.3
1215-6900	20	06:00	<1.3	
1455-7340	20	06:05	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1455-7340	20	06:10	<1.3
	1430-7360	20	06:15	<1.3
	1240-6440	20	06:20	<1.3
	1390-6880	20	18:00	<1.3
	1390-6840	20	18:05	<1.3
	1340-6770	20	18:10	<1.3
	1265-6790	20	18:15	<1.3
	1340-6490	20	18:20	<1.3
	1480-7360	21	06:00	<1.3
	1390-CFTO	21	06:05	<1.3
	1480-7420	21	06:10	<1.3
	1505-RAMPA	21	06:15	<1.3
	1455-6340	21	06:20	<1.3
	1240-C/FO	21	18:00	<1.3
	1430-7340	21	18:05	<1.3
	1240-6560	21	18:10	<1.3
	1480-7440	21	18:15	<1.3
	1215-6540	21	18:20	<1.3
	1480-7360	22	06:00	<1.3
	1390-CFTO	22	06:05	<1.3
	1480-7420	22	06:10	<1.3
	1505-RAMPA	22	06:15	<1.3
	1455-6340	22	06:20	<1.3
	1240-C/FO	22	18:00	<1.3
	1430-7340	22	18:05	<1.3
	1240-6560	22	18:10	<1.3
	1480-7440	22	18:15	<1.3
	1215-6540	22	18:20	<1.3
	1430-7340	23	06:00	<1.3
	1455-7340	23	06:05	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1215-6540PROD	23	06:10	<1.3
	1505-RAMPA	23	06:15	<1.3
	1340-6490	23	18:00	<1.3
	1480-7440	23	18:05	<1.3
	1430-7370	23	18:10	<1.3
	1480-7420	24	06:00	<1.3
	1215-6900	24	06:05	<1.3
	1480-VENT	24	06:10	<1.3
	1505-AUX	24	18:00	<1.3
	1390-6840	24	18:05	<1.3
	1390-C/F.O	24	18:10	<1.3
	1480-7420	25	06:00	<1.3
	1215-6900	25	06:05	<1.3
	1480-VENT	25	06:10	<1.3
	1505-AUX	25	18:00	<1.3
	1390-6840	25	18:05	<1.3
	1390-C/F.O	25	18:10	<1.3
	1390-CFTO	26	06:00	<1.3
	1505-ACCS	26	06:05	<1.3
	1430-7370	26	06:10	<1.3
	1480-7400	26	06:15	<1.3
	1480-7380	26	18:00	<1.3
	1480-VENT	26	18:05	<1.3
	1390-6840	27	06:00	<1.3
	1190-6360	27	06:05	<1.3
	1340-6770	27	06:10	<1.3
	1480-7360	27	06:15	<1.3
1430-7340	27	18:00	<1.3	
1455-7340	27	18:05	<1.3	
1315-6730	27	18:10	<1.3	

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1505-RAMPA	27	18:15	<1.3
	1505-ACC.	27	18:20	<1.3
	1215-6900	28	06:00	<1.3
	1480-7400	28	06:05	<1.3
	1480-7380	28	06:10	<1.3
	1430-7380	28	06:15	<1.3
	1240-CF-O	28	06:20	<1.3
	1265-6790	28	18:00	<1.3
	1340-6770	28	18:05	<1.3
	1390-CFTO	28	18:10	<1.3
	1415-ACCE	28	18:15	<1.3
	1480-7360	28	18:20	<1.3
	1290-CFTE	29	06:00	<1.3
	1480-VENT	29	06:05	<1.3
	1430-7340	29	06:10	<1.3
	1390-6840	29	06:15	<1.3
	1315-6730 PROD	29	06:20	<1.3
	1480-7380	29	18:00	<1.3
	1430-7370	29	18:05	<1.3
	1340-6980 DESG	29	18:10	<1.3
	1265-6970	29	18:15	<1.3
	1390-6800	30	06:00	<1.3
	1215-6900	30	06:05	<1.3
	1480-SERV	30	18:00	<1.3
	1315-6730	30	18:05	<1.3
	1480-7360	30	18:10	<1.3
	1240-CFTO	30	18:15	<1.3
	1390-6840	30	18:20	<1.3
	1290-CFTE	30	18:25	<1.3
	1455-7340	31	06:00	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1340-6770	31	06:05	<1.3
	1415-ACSS	31	06:10	<1.3
	1315-6730	31	06:15	<1.3
	1340-6960	31	06:20	<1.3
	1430-7370	31	18:00	<1.3
	1505-RAMPA	31	18:05	<1.3

Mes	Sitio	Día	HORA	Velocidad de Partícula (mm/s)
Julio	1480-7380	31	18:10	<1.3
	1480-SERVI	31	18:15	<1.3

Donde mm/s: milímetros por segundo. Fuente: MSR, 2016.

8 Geoquímica de Roca Estéril

8.1 Sitios de Monitoreo

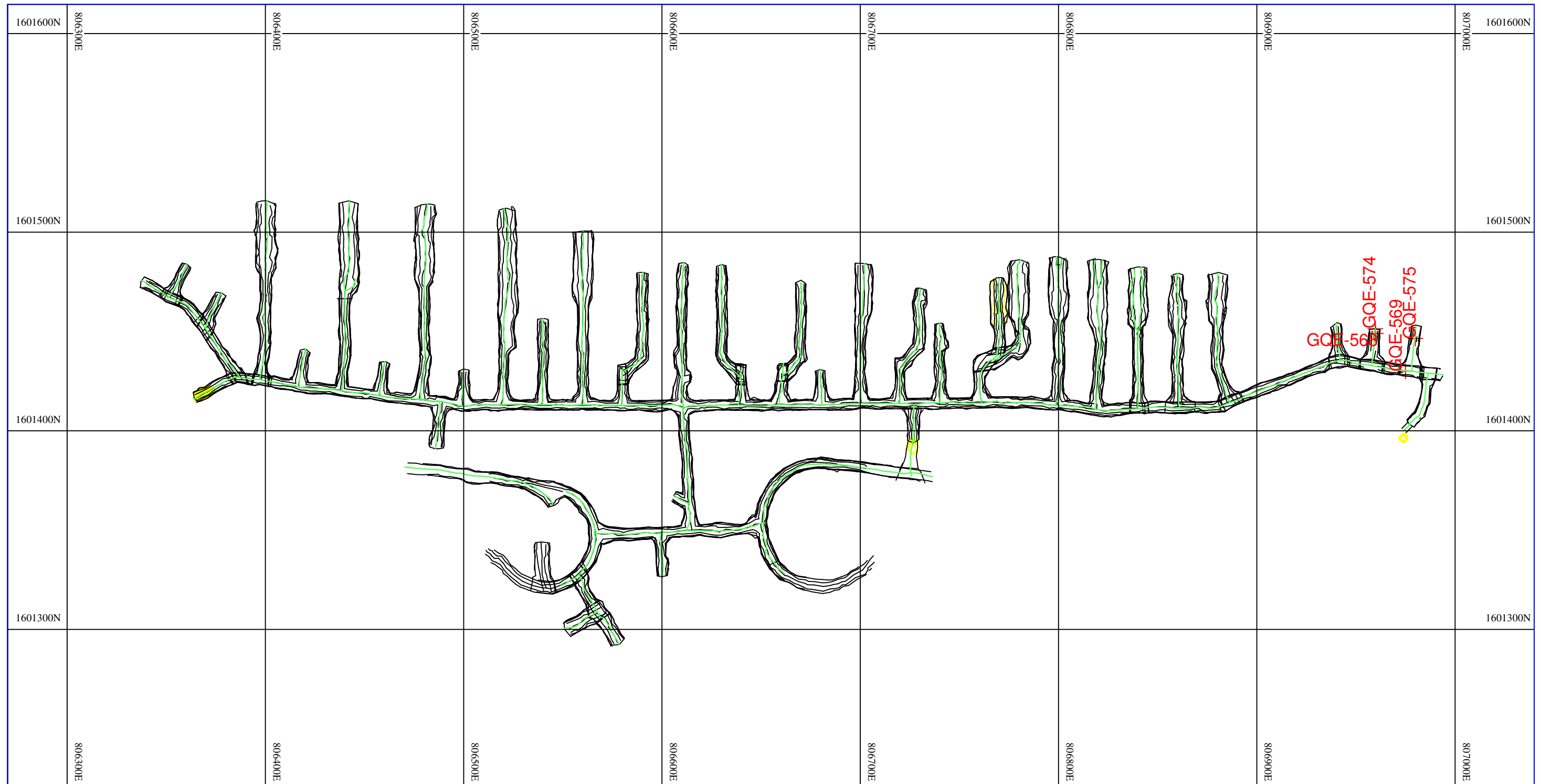
En el Cuadro 8-1 se enlistan las muestras analizadas de material extraído de los túneles del proyecto, rampa oeste y rampa este, durante los meses de Mayo a Julio de 2016. La ubicación de la extracción de las muestras se presenta en la Figura 8-1, Figura 8-2, Figura 8-3, Figura 8-4, Figura 8-5, Figura 8-6, Figura 8-7 y Figura 8-8.

Cuadro 8-1: Sitios de Material Extraído de los Túneles, Proyecto Minero Escobal

Código de Muestra	Área	Coordenadas		
		X	Y	Z
GQE-559	1430-7460-ZE	807461.5	1601621.5	1434
GQE-560	1455-7480-ZE	807480	1601629.5	1453
GQE-561	1390-6860-EC	806860	1601398	1392
GQE-562	1480-7400-ZE	807400	1601612	1479
GQE-563	1430-7480-ZE	807481	1601626	1434
GQE-564	1430-CFTE-ZE	807501	1601617.5	1434
GQE-565	1390-6880-EC	806880	1601389.5	1392
GQE-566	1365-CFTE-EC	807005.5	1601395	1371
GQE-567	1480-CFTE-ZE	806471	1601622.5	1480
GQE-568	1240-6960-E	806960	1601449	1246
GQE-569	1240-CFTE-EC	806975	1601430	1246
GQE-570	1480-CFTO-ZE	807332.5	1601597.5	1481
GQE-571	1455-7500-ZE	807500.5	1601629.5	1454
GQE-572	1480-Ramp-ZE	807495	1601556.5	1498
GQE-573	1390-CFTO-EC	806829	1601349.4	1392
GQE-574	1240-6960-E	806959.81	1601451.39	1246
GQE-575	1240-6980-E	806968	1601446.5	1246
GQE-576	1480-7420-ZE	807421	1601607	1479
GQE-577	1480-7440-ZE	807445	1601623	1480
GQE-578	1480-7380-ZE	807380	1601611	1480
GQE-579	1480-VENT-ZE	807319	1601580	1481
GQE-580	1480-7460-ZE	807461	1601637.5	1480
GQE-581	1455-7340-ZE	807340.5	1601600	1453
GQE-582	1430-7360-ZE	807342	1601588	1431
GQE-583	1430-7500-ZE	807500.5	1601635	1434
GQE-584	1290-7100-E	807101	1601471.5	1293

Código de Muestra	Área	Coordenadas		
		X	Y	Z
GQE-585	1390-6840-EC	806846	1601382.5	1392
GQE-586	1480-7480	807481	1601644	1480

Fuente: MSR, 2016.



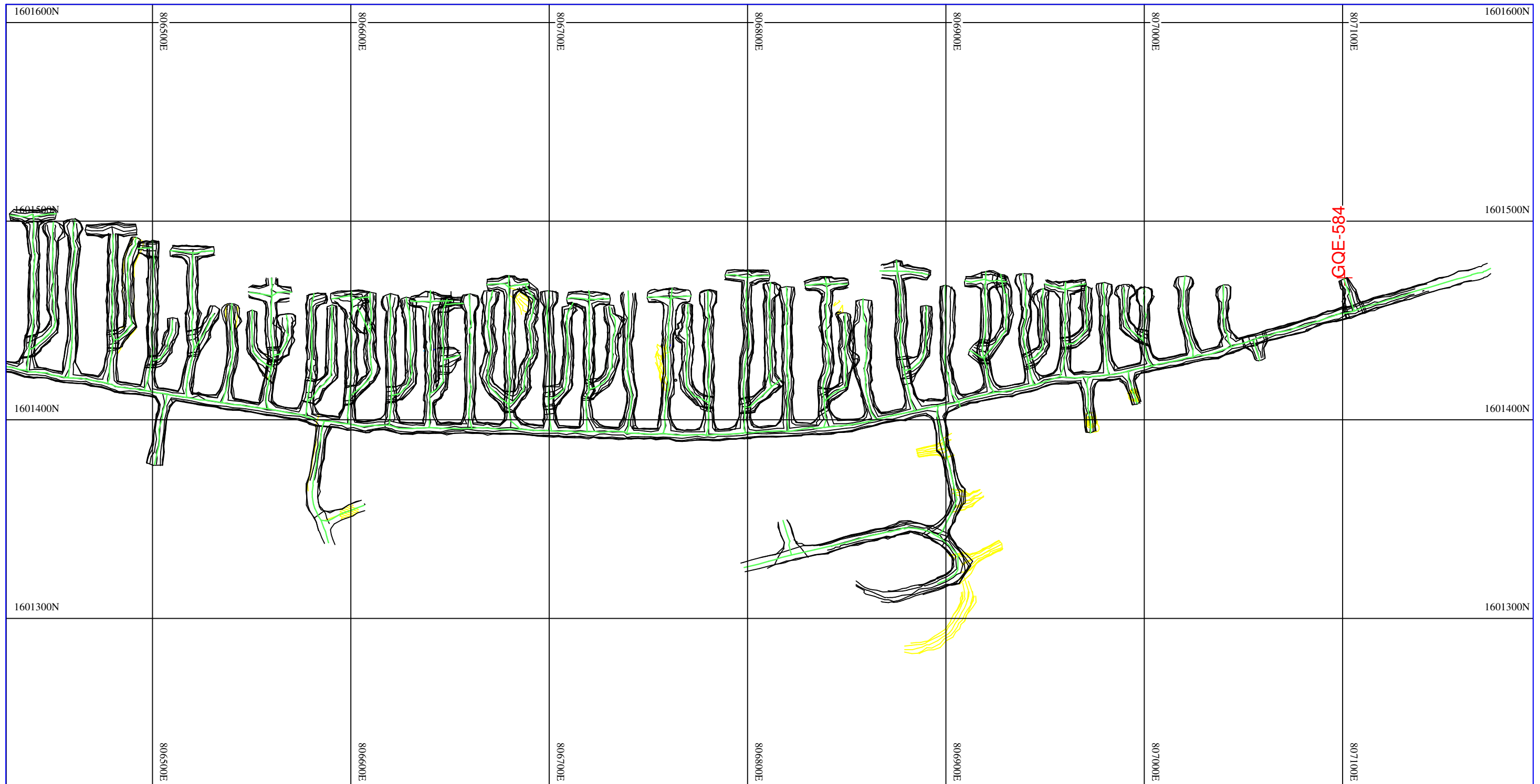
Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1240

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

mayo_julio_2016_nivel_1240



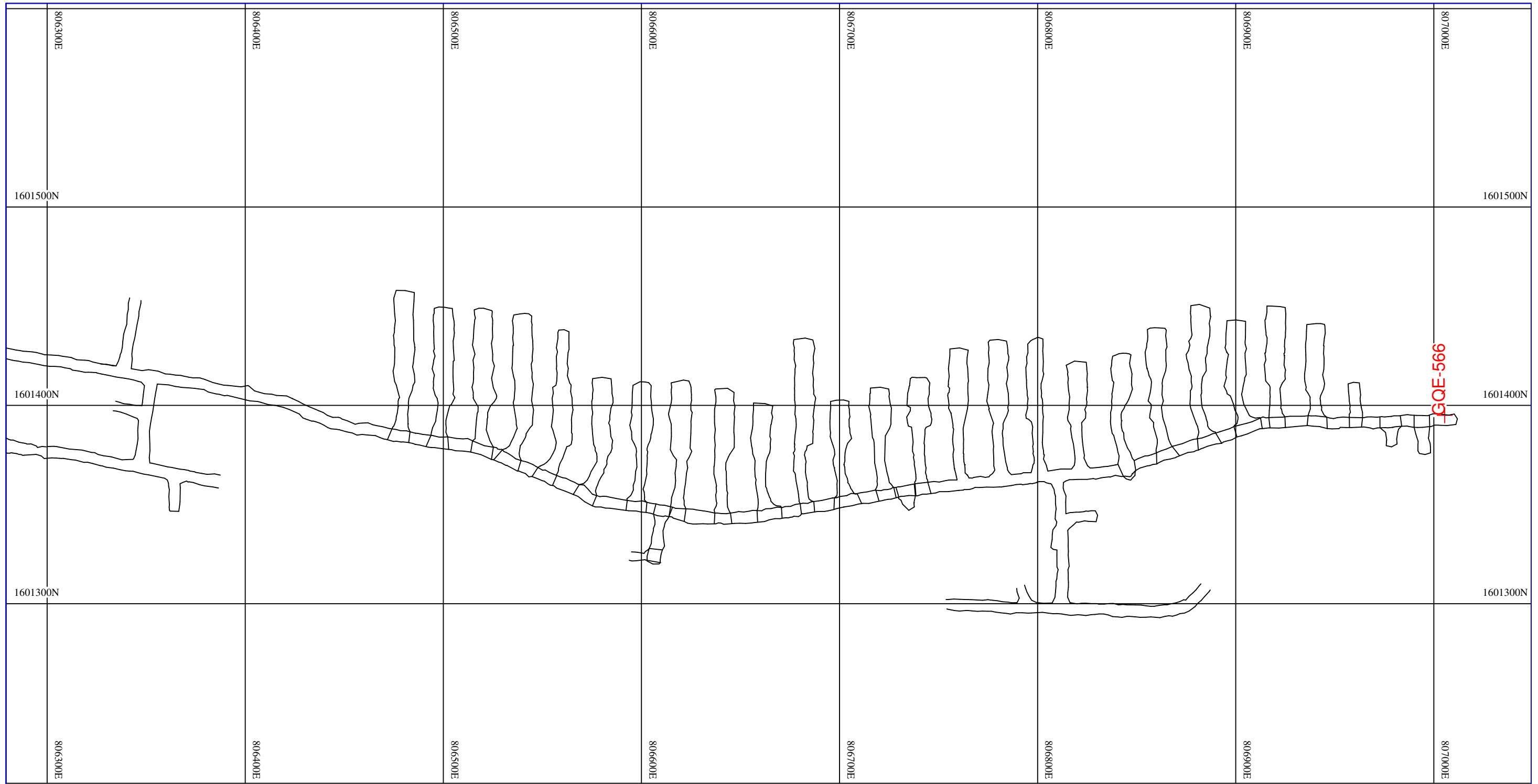
Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1290

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

mayo_julio_2016_nivel_1290



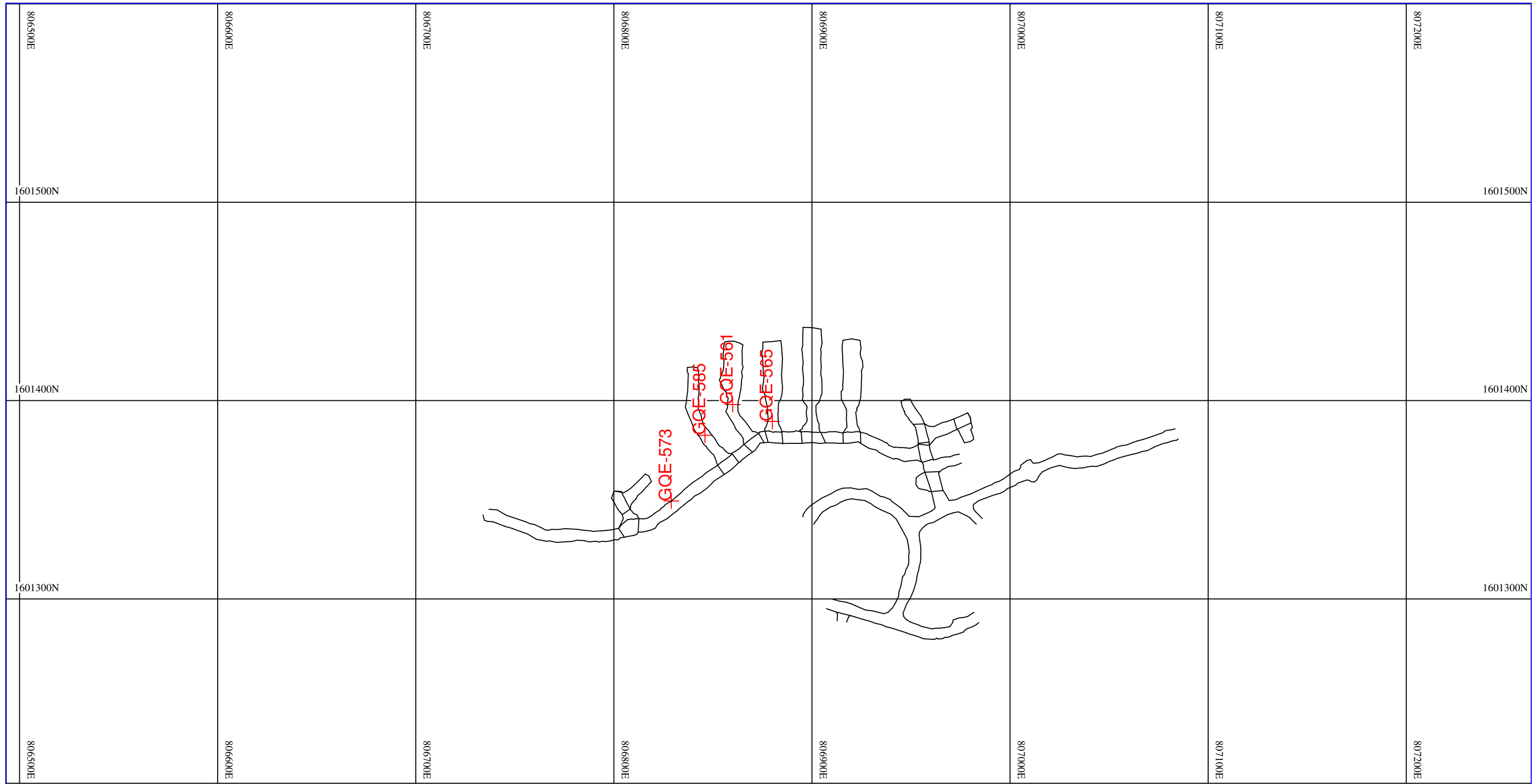
Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1365

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

mayo_julio_2016_nivel_1365



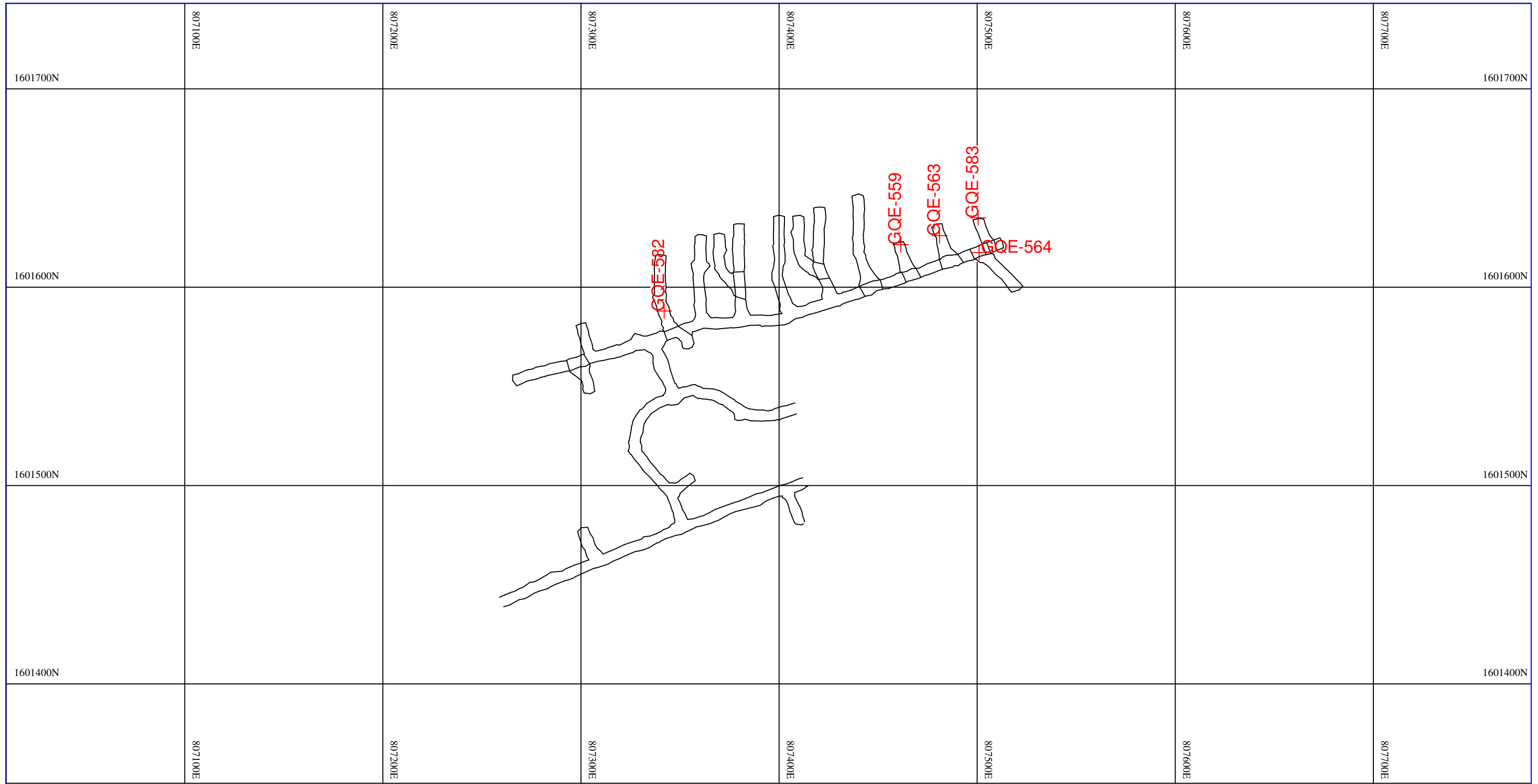
Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1390

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

mayo_julio_2016_nivel_1390



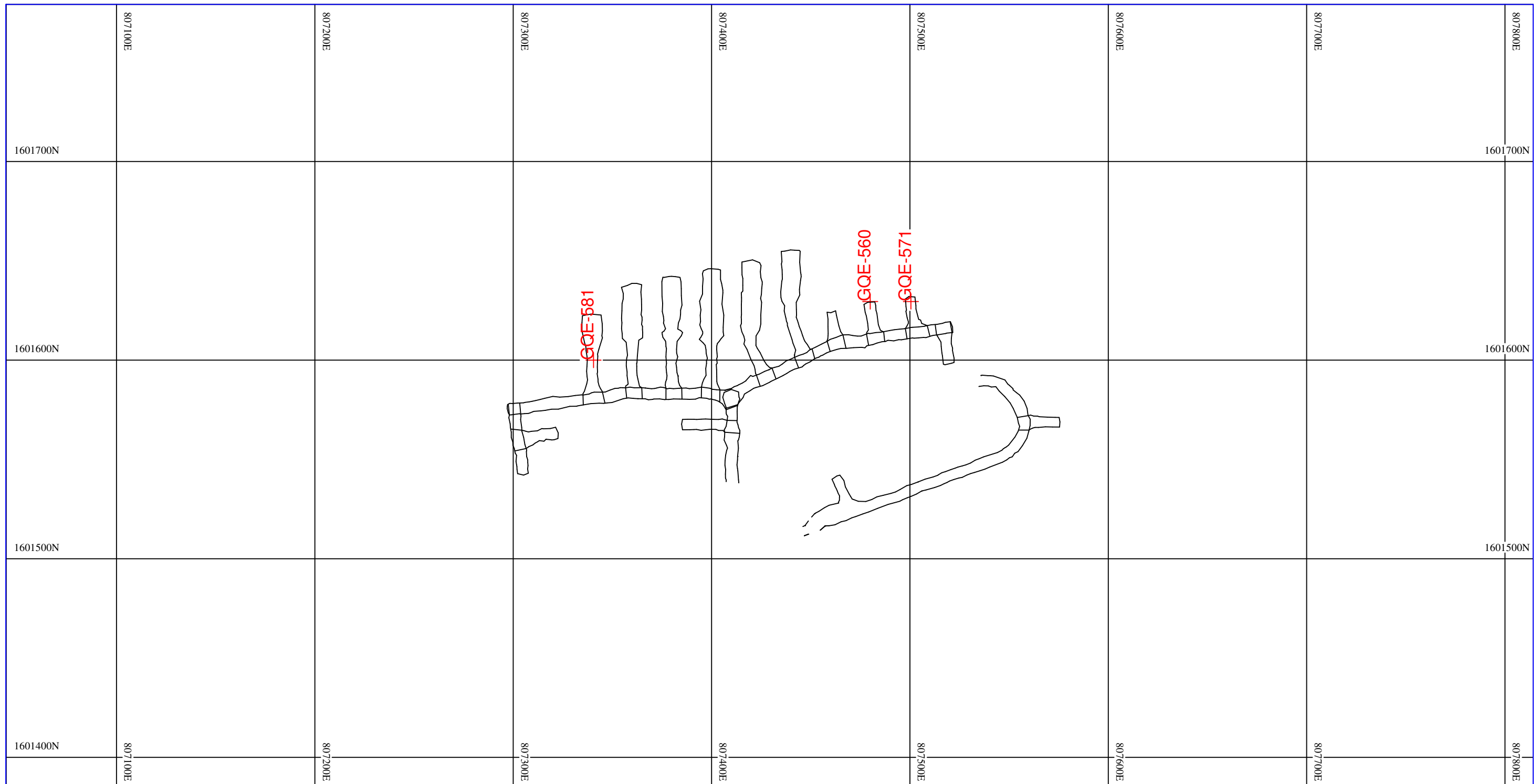
Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1430

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

mayo_julio_2016_nivel_1430

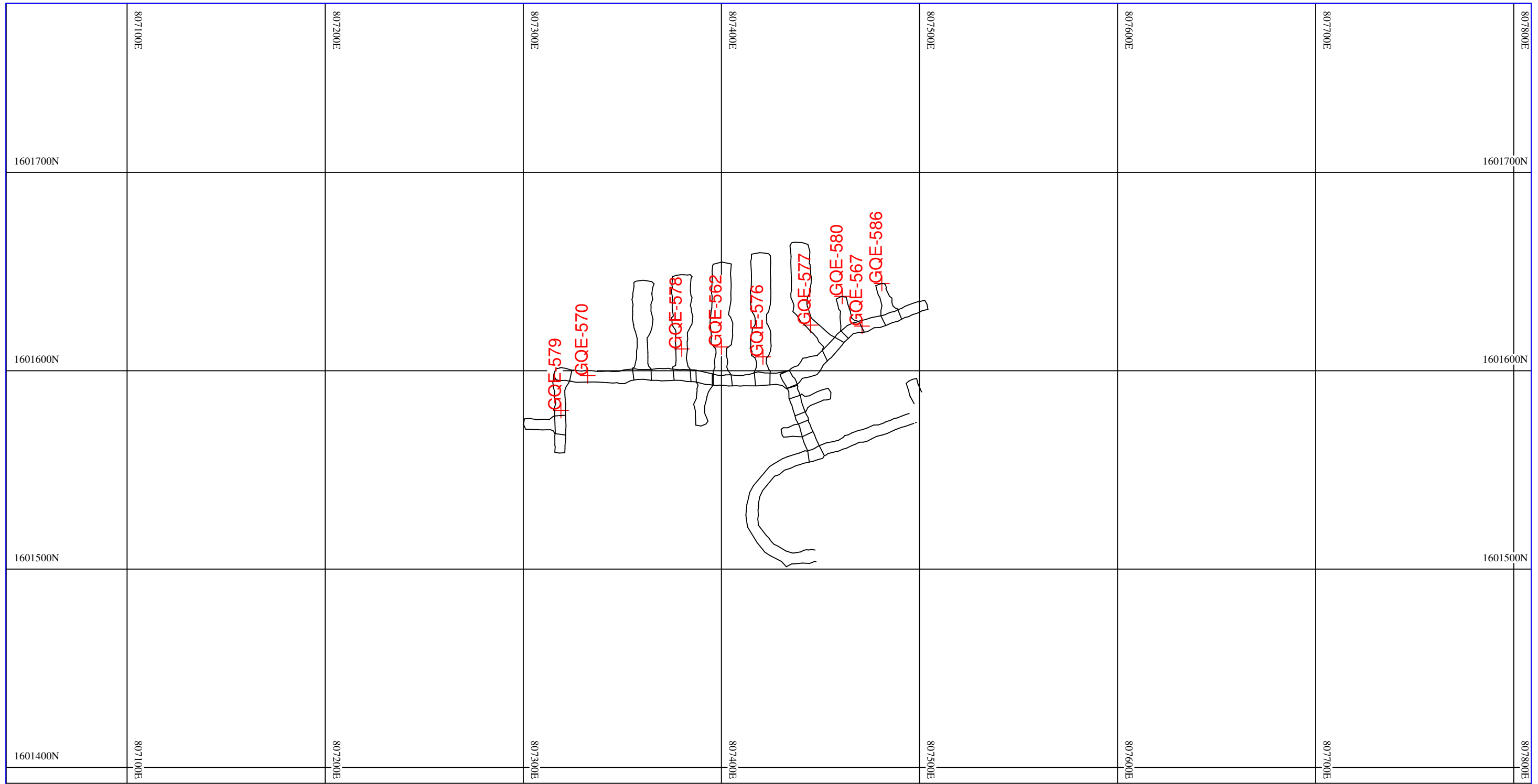


Drenaje Ácido de Roca (ARD)
 Mayo-Julio 2016

Nivel 1455

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

mayo_julio_2016_nivel_1455

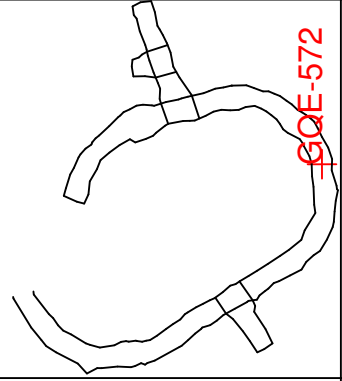


Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1480

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

1601700N	807200E	807300E	807400E	807500E	807600E	807700E	807800E	1601700N
1601600N								1601600N
1601500N								1601500N
1601400N								1601400N
	807200E	807300E	807400E	807500E	807600E	807700E	807800E	



Drenaje Ácido de Roca (ARD)

Mayo-Julio 2016

Nivel 1505-RAMPA

DIBUJO:	Herberth Cacao	
REVISO:	Richard Yancey	
Depto.	Geología de Mina	
Scale: 1: 2000	Plan No.	Date: 20-Sep-16

8.2 Metodología

En el Cuadro 8-2 se describe el procedimiento y equipo utilizado para la toma de muestras en pasta de material extraído en túneles.

Cuadro 8-2: Procedimiento y equipo utilizado para monitorear pH en pasta de material extraído de los túneles, Proyecto Minero Escobal

Parámetros analizados	
pH	pH en pasta.
Procedimiento	
Basados en el método ASTM D4972-01(2007) Standard Test Method for pH of Soils. Se determinó el pH en suspensión de Roca-Agua 1:1 p/v: esto se logró tomando 50 gramos de roca pulverizada y agregándole 50 ml de agua desmineralizada, se agita por 10 minutos y se deja reposar por 10 minutos más, luego se hace lectura directa de pH sobre la suspensión con la ayuda de un potenciómetro previamente calibrado.	
Equipo utilizado	
Nombre	Potenciómetro pH & EC
Modelo	H-series H170G
Fabricante	HACH

Fuente: MSR, 2016.

8.3 Resultados

Los resultados de pH en pasta se presentan en el Cuadro 8-3. Los valores de pH se encontraron en el rango de 8.08 a 8.85 u.e. los cuales no dieron indicios de un potencial de generación ácida. Por lo que no fue necesario realizar pruebas de laboratorio para el cálculo de ácido base modificado (ABA por sus siglas en inglés) para descartar o confirmar resultados.

Cuadro 8-3: Resultados de pH en Pasta en muestras de material extraído de Túneles, Proyecto Minero Escobal

Código de Muestra	Fecha Toma de Muestra	Fecha Lectura pH	pH pasta	Temperatura (°C)
GQE-559	06/05/2016	09/05/2016	8.55	NA
GQE-560	06/05/2016	09/05/2016	8.62	
GQE-561	14/05/2016	15/05/2016	8.55	
GQE-562	14/05/2016	15/05/2016	8.58	
GQE-563	14/05/2016	15/05/2016	8.70	
GQE-564	14/05/2016	15/05/2016	8.85	
GQE-565	22/05/2016	23/05/2016	8.11	21.4
GQE-566	22/05/2016	23/05/2016	8.48	21.4
GQE-567	27/05/2016	30/05/2016	8.43	21.1
GQE-568	01/06/2016	05/06/2016	8.08	20.2
GQE-569	01/06/2016	05/06/2016	8.58	20.3

Código de Muestra	Fecha Toma de Muestra	Fecha Lectura pH	pH pasta	Temperatura (°C)
GQE-570	02/06/2016	04/06/2016	8.43	20.6
GQE-571	16/06/2016	19/06/2016	8.39	21.3
GQE-572	16/06/2016	19/06/2016	8.46	21.4
GQE-573	16/06/2016	19/06/2016	8.61	21.5
GQE-574	18/06/2016	19/06/2016	8.59	21.7
GQE-576	06/07/2016	13/07/2016	8.39	19.1
GQE-577	06/07/2016	13/07/2016	8.66	18.6
GQE-578	06/07/2016	13/07/2016	8.59	18.1
GQE-579	06/07/2016	13/07/2016	8.43	17.6
GQE-580	07/07/2016	13/07/2016	8.75	18.5
GQE-581	07/07/2016	13/07/2016	8.57	17.5
GQE-582	07/07/2016	13/07/2016	8.65	17.2
GQE-583	07/07/2016	13/07/2016	8.20	17.9
GQE-584	16/07/2016	18/07/2016	8.63	22.1
GQE-585	16/07/2016	18/07/2016	8.51	21.5
GQE-586	16/07/2016	18/07/2016	8.65	22

Fuente: MSR, 2016.

9 Mediciones de Seguridad Industrial y Salud Ocupacional

9.1 Presión Sonora

La medición de Presión Sonora en el trimestre de Mayo a Julio 2016 se muestra en el Cuadro 9-1. Se hicieron monitoreos mediante el uso de dosímetros portables y posteriormente se realizan comparaciones con la norma OSHA y al acuerdo gubernativo 229. Los resultados muestran que se está dentro de parámetros aceptables OSHA en los puntos evaluados. Sin embargo se incumple en dos monitoreos por fallas operativas en los equipos utilizados, por lo que como medida correctiva se reemplazó el tipo de protección auditiva que se utilizaba para que en los próximos monitoreos se cumpla con los límites máximos permisibles establecidos. Se debe considerar que el parámetro Leq está acumulado para periodo de 10.6 para operaciones en mina subterránea y 12 horas para operaciones en superficie, lo que implica una mayor dosis recibida por efecto de acumulación.

Cuadro 9-1: Resultados de Presión Sonora de Salud Ocupacional, Proyecto Minero Escobal

Superficie Planta de Proceso - TRITURADORA		2016		
Mes		Mayo	Junio	Julio
Fecha		23/05/16	28/06/16	20/07/16
Hora Inicio		7:39	7:00	6:50
Duración		09:24 h	10.17 h	10:54 h
Lmax dBA		129.8	117.8	108.8
Lmin dBA		63.1	63.4	63.1
Prom. Diurno dBA		92.3	99	91.4
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo 229-2014, para 12 horas (12.1 horas y 10.6 horas)*		85	85	85
Leq (Normal sin uso de EPP)		92.3	99	91.4
Leq ajustado (Con EPP, homologación 29 dBA a 50% = NRR 14.5 dBA)		77.8	84.5	76.9
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable	Aceptable	Aceptable

Superficie Planta de Proceso - MOLINO		2016		
Mes		Mayo	Junio	Julio
Fecha		26/05/16	24/06/16	20/07/16
Hora Inicio		6:48	6:56	7:44
Duración		10:34 h	10:38 h	10:16 h
Lmax dBA		115.4	114.2	135.5
Lmin dBA		63.1	63.1	63.1
Prom. Diurno dBA		90.4	94.5	94.1
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo 229-2014, para 12 horas (12.1 horas y 10.6 horas)*		85	85	85
Leq (Normal sin uso de EPP)		90.4	94.5	94.1
Leq ajustado (Con EPP, homologación 29 dBA a 50% = NRR 14.5 dBA)		75.9	80	79.6
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable	Aceptable	Aceptable

Superficie Planta de Proceso - FILTROS		2016		
Mes		Mayo	Junio	Julio
Fecha		27/05/16	29/06/16	17/07/16
Hora Inicio		6:57	7:01	6:30
Duración		10:43 h	10:38 h	11:12 h
Lmax dBA		107.5	128.2	140.9
Lmin dBA		63.1	63.1	63.1
Prom. Diurno dBA		81.4	91.2	100.5
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo 229-2014, para 12 horas (12.1 horas y 10.6 horas)*		85	85	85
Leq (Normal sin uso de EPP)		81.4	91.2	100.5
Leq ajustado (Con EPP, homologación 29 dBA a 50% = NRR 14.5 dBA)		66.9	76.7	86
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable	Aceptable	No Aceptable

Puesto de Operador de Scoop		2016		
Mes		Mayo	Junio	Julio
Fecha		20/05/16	29/06/16	
Hora Inicio		7:21	7:07	
Duración		10:01 h	10:48 h	
Lmax dBA		128.5	113.1	
Lmin dBA		69.5	63.1	
Prom. Diurno dBA		113.7	96.8	
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo 229-2014, para 12 horas (12.1 horas y 10.6 horas)*		85	85	
Leq (Normal sin uso de EPP)		113.7	96.8	
Leq ajustado (Con EPP, Tapón Auditivo=homologación 29 dBA a 50% = NRR 14.5 dBA)		85.7	68.8	
(Orejera= Homologación 27 dB a 50%= NRR 13.5dB)				
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		No Aceptable	Aceptable	Aceptable

NOTA: Operadores utilizan doble protección Auditiva

Puesto de Operador de Jumbo		2016		
Mes		Mayo	Junio	Julio
Fecha		19/05/16	28/06/16	28/07/16
Hora Inicio		7:22	6:28	6:59
Duración		09:56 h	11:04 h	10:32 h
Lmax dBA		121.2	115.4	114.8
Lmin dBA		71.5	63.1	63.1
Prom. Diurno dBA		98.6	96	95.5
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo 229-2014, para 12 horas (12.1 horas y 10.6 horas)*		85	85	85
Leq (Normal sin uso de EPP)		98.6	96	95.5
Leq ajustado (Con EPP, homologación 29 dBA a 50% = NRR 14.5 dBA)		84.1	81.5	81
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable	Aceptable	Aceptable

Puesto de Operador de Boltec		2016		
Mes		Mayo	Junio	Julio
Fecha		18/05/16	24/06/16	27/07/16
Hora Inicio		7:26	6:41	6:46
Duración		09:51 h	11:35 h	10:55 h
Lmax dBA		119.7	118.2	114.8
Lmin dBA		71.2	63.1	63.1
Prom. Diurno dBA		100.8	97.1	93.5
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo		85	85	85
Leq (Normal sin uso de EPP)		100.8	97.1	93.5
Leq ajustado (Con EPP, Tapón Auditivo=homologación 29 dBA a 50% = NRR 14.5 dBA)		72.8	69.1	65.5
(Orejera= Homologación 27 dB a 50%= NRR 13.5dB)				
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable	Aceptable	Aceptable

Fuente: MSR, 2016.

9.2 Mediciones de Partículas Respirables

Los resultados se muestran en el Cuadro 9-2 y corresponden al área de interior mina y planta de proceso. En este trimestre los resultados fueron satisfactorios y se está dentro de parámetros aceptables, en algunos casos de manera normal y otros después de la aplicación del factor de compensación por homologación de EPP, por lo tanto se está dentro de rango y en ningún momento se excede el límite normal, que es el parámetro que refiere el fabricante para el respirador usado en las áreas de monitoreo, marca 3M código 7502 y filtro 3M código 60926 P100 Homologación NIOSH.

Cuadro 9-2: Resultados de Material Particulado de Salud Ocupacional, Proyecto Minero Escobal

Superficie Planta de Proceso - TRITURACION							2016		
Trimestre							XVIII		
Mes	Unidades	NORMA DE REFERENCIA PARA SILICE/SILICONA	AJUSTE DE EXPOSICIÓN CON LA CERTIFICACION DEL FILTRO 7093C/37173 3M P100 (99.97% DE EFICIENCIA MÍNIMA) CON EPP	NORMA µg/m3	GUIA µg/m3		Mayo	Junio	Julio
Fecha					USEPA ¹	BANCO MUNDIAL ²	27/05/2016	30/06/2016	22/07/2016
Hora Inicio							7:00	7:00	7:00
Duración							11 h	11 h	11 h
OSHA Fraccion Respirable PM ₄	mg/m ³	5	16667	150	150	50	0.178	0.397	0.09
OSHA Polvo Total @ PM ₁₀	mg/m ³	15	50000	150	150	50	0.217	0.675	0.151

Nota: OSHA Fracción respirable no fue tomado en esta ocasión, sin embargo sea con el uso de EPP o sin el uso de el (ajustando con la norma OSHA) del respirador mismo, ajuste recomendado por el fabricante, estamos dentro de parámetros, es decir que si comparamos aún la norma para fracción respirable con el resultado de Polvo Total, estamos mas que seguros de estar dentro de norma.

Superficie Planta de Proceso - MOLINO							2016		
Trimestre							XVIII		
Mes	Unidades	NORMA DE REFERENCIA PARA SILICE/SILICONA	AJUSTE DE EXPOSICIÓN CON LA CERTIFICACION DEL FILTRO 7093C/37173 3M P100 (99.97% DE EFICIENCIA MÍNIMA) CON EPP	NORMA µg/m3	GUIA µg/m3		Mayo	Junio	Julio
Fecha					USEPA ¹	BANCO MUNDIAL ²	27/05/2016	25/06/2016	22/07/2016
Hora Inicio							7:00	7:00	7:00
Duración							11 h	11 h	11 h
OSHA Fraccion Respirable PM ₄	mg/m ³	5	16667	150	150	50	0.096	0.047	0.068
OSHA Polvo Total @ PM ₁₀	mg/m ³	15	50000	150	150	50	0.114	0.093	0.161

Nota: OSHA Fracción respirable no fue tomado en esta ocasión, sin embargo sea con el uso de EPP o sin el uso de el (ajustando con la norma OSHA) del respirador mismo, ajuste recomendado por el fabricante, estamos dentro de parámetros, es decir que si comparamos aún la norma para fracción respirable con el resultado de Polvo Total, estamos mas que seguros de estar dentro de norma.

Superficie Planta de Proceso - FILTROS							2016		
Trimestre							XVIII		
Mes	Unidades	NORMA DE REFERENCIA PARA SILICE/SILICONA	AJUSTE DE EXPOSICIÓN CON LA CERTIFICACION DEL FILTRO 7093C/37173 3M P100 (99.97% DE EFICIENCIA MÍNIMA) CON EPP	NORMA µg/m3	GUIA µg/m3		Mayo	Junio	Julio
Fecha					USEPA ¹	BANCO MUNDIAL ²	27/05/2016	25/06/2017	22/07/2016
Hora Inicio							7:00	7:00	7:00
Duración							11 h	11 h	11 h
OSHA Fraccion Respirable PM ₄	mg/m ³	5	16667	150	150	50	0.054	0.044	0.014
OSHA Polvo Total @ PM ₁₀	mg/m ³	15	50000	150	150	50	0.059	0.064	0.016

Nota: OSHA Fracción respirable no fue tomado en esta ocasión, sin embargo sea con el uso de EPP o sin el uso de el (ajustando con la norma OSHA) del respirador mismo, ajuste recomendado por el fabricante, estamos dentro de parámetros, es decir que si comparamos aún la norma para fracción respirable con el resultado de Polvo Total, estamos mas que seguros de estar dentro de norma.

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Interior Mina General - REZAGA							2016		
Trimestre							XVIII		
Mes	Unidades	NORMA DE REFERENCIA PARA SILICE/SILICONA	AJUSTE DE EXPOSICIÓN CON LA CERTIFICACION DEL FILTRO 7093C/37173 3M P100 (99.97% DE EFICIENCIA MÍNIMA) CON EPP	NORMA µg/m3	GUIA µg/m3		Mayo	Junio	Julio
Fecha					USEPA ¹	BANCO MUNDIAL ²	OMS ³	18/05/2016	27/06/2016
Hora Inicio							7:00	7:00	7:00
Duración		OSHA	99.97%				11 h	11 h	11 h
OSHA Fraccion Respirable PM ₄	mg/m ³	5	16667	150	150	50	1.150	1.59	0.786
OSHA Polvo Total @ PM ₁₀	mg/m ³	15	50000	150	150	50	1.340	2.06	0.84

Nota: OSHA Fracción respirable no fue tomado en esta ocasión, sin embargo sea con el uso de EPP o sin el uso de el (ajustando con la norma OSHA) del respirador mismo, ajuste recomendado por el fabricante, estamos dentro de parámetros, es decir que si comparamos aún la norma para fracción respirable con el resultado de Polvo Total, estamos mas que seguros de estar dentro de norma.

Interior Mina General - LANZADO							2016		
Trimestre							XVIII		
Mes	Unidades	NORMA DE REFERENCIA PARA SILICE/SILICONA	AJUSTE DE EXPOSICIÓN CON LA CERTIFICACION DEL FILTRO 7093C/37173 3M P100 (99.97% DE EFICIENCIA MÍNIMA) CON EPP	NORMA µg/m3	GUIA µg/m3		Mayo	Junio	Julio
Fecha					USEPA ¹	BANCO MUNDIAL ²	OMS ³	18/05/2016	
Hora Inicio							7:00		7:00
Duración		OSHA	99.97%				11 h		11 h
OSHA Fraccion Respirable PM ₄	mg/m ³	5	16667	150	150	50	5.670		5.6
OSHA Polvo Total @ PM ₁₀	mg/m ³	15	50000	150	150	50	5.750		8.2

Nota: OSHA Fracción respirable no fue tomado en esta ocasión, sin embargo sea con el uso de EPP o sin el uso de el (ajustando con la norma OSHA) del respirador mismo, ajuste recomendado por el fabricante, estamos dentro de parámetros, es decir que si comparamos aún la norma para fracción respirable con el resultado de Polvo Total, estamos mas que seguros de estar dentro de norma.

Fuente: MSR, 2016.

9.3 Mediciones de Gas

Las mediciones de Gas, se hacen en forma rutinaria (turno a turno) y debido a que no se ha rebasado los límites permisibles cuando se encuentra maquinaria presente trabajando en las áreas según norma OSHA (Tabla Z1 1910.100 Límites para aires contaminados), los sistemas de ventilación se mantienen trabajando de manera normal. Como se puede apreciar en el Cuadro 9-3 se siguió monitoreando la no presencia de Ácido Sulhídrico - Sulfuro de Hidrógeno (H_2S) y se omitirá hasta detectarse la primera vez. De igual forma, se seleccionará la primera etapa del ciclo que aparezca en las mediciones rutinarias, por lo que en los resultados se ha colocado como mínimo 3 turnos de alguno de los meses del trimestre, a fin de tener información sistematizada.

Cuadro 9-3: Extracto de las mediciones del XVIII trimestre, acorde a procedimiento de tomar la primera etapa del ciclo que aparezca.

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FECHA	Lugar	Maquinaria	Etapas de Ciclo	CO (PPM)	H2S (PPM)	Hora	Turno	Reportado por
				Límite Máximo Turno 25 ppm, Exposición Breve 50 ppm	Límite 10ppm, Valores mayores a 1ppm alertar.			
01-may-16								
	1240-6880.EC	Ninguna	Medición posterior a voladura	39	0	08:30	Diurno	José Carrillo
	1215-6880.EC	Ninguna	Medición posterior a voladura	42	0	09:10		
	1480-CFTE.ZE	Ninguna	Medición posterior a voladura	25	0	07:05		
	1480-7440.ZE	Ninguna	Medición posterior a voladura	25	0	07:05		
	1265-6930.EC	Ninguna	Medición posterior a voladura	35	0	07:10		
1430-7460.ZE	Ninguna	Medición posterior a voladura	10	0	07:05			
02-jun-16								
	1290-6740	Ninguna	Medición posterior a voladura	0	0	14:05	Diurno	Jose Lerva
	1265-SUMIDERO	Ninguna	Medición posterior a voladura	0	0	14:37		
	1240-CFTE.EC	Ninguna	Medición posterior a voladura	8	0	15:14		
1240-CFTE.OC	Ninguna	Medición posterior a voladura	2	0	15:30			
02-jul-16								
	1480-7380	Ninguna	Medición posterior a voladura	30	0	07:51	Diurno	Ludyn Lima/ Javier Maldonado
	1480-CFTE.ZE	Ninguna	Medición posterior a voladura	10	0	07:48		
	1240-6560	Ninguna	Medición posterior a voladura	23	0	07:41		
	1215-6360	Ninguna	Medición posterior a voladura	39	0	08:15		

Fuente: MSR, 2016.

10 Conclusiones

10.1 Mediciones del aire en el ambiente

- 1) El material particulado (**PM₁₀**), los gases de combustión (**SO₂** y **NO₂**) y los niveles de presión sonora (**NPS**) presentaron valores por debajo de las guías establecidos por la USEPA (**PM₁₀**, **SO₂** y **NO₂**), Banco Mundial (**PM₁₀**, **SO₂**, **NO₂** y **NPS**), OMS (**SO₂** y **NO₂**) y British Columbia (**SO₂** y **NO₂**). Los niveles de **PM₁₀** se encontraron dentro de los valores máximos y mínimos registrados durante el establecimiento de la línea base del Proyecto y el mercurio en **PM₁₀** se detectó en todas las estaciones, a excepción de una estación, encontrándose ligeramente arriba del límite de detección del método.

10.2 Mediciones del agua, sedimentos y efluentes en el ambiente

- 2) Del control de calidad (blancos de campo) realizado a los dos laboratorios subcontratados (Laboratorio Ecosistemas Proyectos Ambientales S.A. y ACZ Laboratories, Inc.) para el análisis de agua superficial y efluentes, se obtuvieron resultados confiables tanto en la manipulación de las muestras como en los resultados de los análisis.
- 3) El agua superficial (**SW**), subterránea (**GW**) y los pozos de monitoreo (**MW**) presentaron un pH alcalino y dentro del rango establecido por la USEPA para la salud humana. No se detectó mercurio y cianuro total en ninguna categoría de agua (SW, GW y MW). Se registraron sólidos suspendidos totales en SW y MW y los resultados encontrados están por debajo de lo establecido por las guías del banco mundial (50 mg/L). Se detectaron cloruros en SW, GW y MW, todos los valores por debajo de lo sugerido por la USEPA (250 mg/L). Se detectó arsénico en todas las categorías de agua (SW, GW y MW) y todos los resultados se encontraron por debajo de los establecido por la USEPA (0.01 mg/L) y dentro del rango registrado durante el establecimiento de la línea base. El plomo se detectó en SW, GW y MW en concentraciones por debajo de lo sugerido por la USEPA y por debajo del rango de lo establecido durante la línea base.
- 4) El efluente (**WW9**) de la planta de tratamiento de aguas residuales de tipo especial del proceso de minado cumple con el Acuerdo Gubernativo 236-2006 para entes generadores nuevos para todas las muestras tomadas durante Mayo a Julio 2016.

10.3 Vibraciones, geoquímica de roca estéril y mediciones de seguridad industrial y salud ocupacional

- 5) Las vibraciones generadas por las voladuras registradas se encuentran por debajo de los límites de detección del equipo (1.3 mm/s); el cual incluso es menor al límite a partir del cual, las vibraciones inducidas por voladuras (50.8 mm/s), pueden ocasionar daños según la norma establecida por United States Bureau of Mines.
- 6) Las lecturas de pH en pasta obtenidas de las muestras de material extraídas de mina subterránea fueron alcalinas, lo que indica que no hay indicios de un potencial de generación ácida dentro los túneles.
- 7) Los resultados obtenidos en los niveles de presión sonora para ambientes laborales, indican que se está por debajo de los límites de nivel de sonido ponderado "A" acorde a OSHA para 24 horas (82-83 dBA) y los resultados de partículas respirables en las estaciones de monitoreo, cumplen con el rango de aceptación que el fabricante establece basado en el equipo marca 3M código 7502 y filtro 3M código 60926 P100 Homologación NIOSH.

11 Anexos

11.1 Caudal Bombeado de Túneles a Planta de Tratamiento y su descarga hacia la Quebrada El Escobal

En las siguientes tablas se presentan las lecturas diarias realizadas a los flujómetros instalados en las cuatro tuberías provenientes de los portales (2 tuberías por portal) y el flujómetro instalado en el clarificador de la Planta de tratamiento de aguas residuales especiales, así como los cálculos del volumen bombeado durante el día de medición y el caudal proyectado por día en cada una de estas tuberías.

El volumen bombeado por día se determinó restando el volumen acumulado del día anterior al volumen acumulado de ese día. El caudal proyectado se determinó suponiendo que el bombeo de agua es constante durante las 24 horas del día (caudal = volumen/tiempo).

Los flujómetros instalados son de tipo ultrasónicos o de efecto Doppler, los cuales tienen la característica de medir el flujo en dos direcciones. Las bombas empleadas para descargar agua procedente de los sumideros ubicados en los portales trabajan a nivel, por tanto se descartan las lecturas de caudal instantáneo ya que los flujómetros instalados registran tanto el caudal instantáneo de ida (signo positivo) como el caudal instantáneo de retorno (signo negativo), lo que conllevaría a reportar caudales menores a los observados en campo.

Mayo 2016																															
Descarga/fecha	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
LECTURA FLUJÓMETRO (m³)																															
Portal Este (tubería 6")	183726.9	183911.2	184234.2	184595.1	185044.1	185725.7	186290.5	186761.8	187209.6	187729.5	188462.4	188786.4	189046.5	189312	189599.7	190000.5	190314.8	190424.4	190426.1	190426.1	190426.4	190427.2	190428.8	190430.5	190431.7	190432.8	190432.8	190432.8	190432.9	190432.9	190671.6
Total Este (tubería 8")	170206.5	170830.9	171509.6	172280.4	172724.4	173027	173250	173507	173777	174005	174005.3	174650.2	175234.4	175735.6	176298.2	176642.7	177199.8	178150.1	179331.7	180308.7	180308.7	180661.9	181446.2	182262.5	183117	184065.7	185276.5	186339.2	187572.7	188693	189380.1
Portal Oeste (tubería 6")	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	396779	397236	399028	400870	402679	404436	406105	407996	409773	411609	413343	415138	416887	418804	420692
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clarificador	4171376	4174595	4178019	4181517	4185106	4188567	4191734	4195060	4198635	4201996	4205495	4208869	4212211	4215569	4218616	4222216	4225290	4228772	4232109	4235630	4241389	4244814	4247948	4251546	4254897	4258186	4260760	4264100	4267645	4271072	4274199
VOLUMEN BOMBEADO (m³)																															
Portal Este (tubería 6")	148	184	323	361	449	682	565	471	448	520	733	324	260	266	288	401	314	110	2	0	0	1	2	2	1	1	0	0	0	0	239
Total Este (tubería 8")	1177	624	679	771	444	302	224	257	270	228	0	645	584	501	563	344	557	950	1182	977	0	353	784	816	855	949	1211	1063	1233	1120	687
Portal Oeste (tubería 6")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	457	1793	1842	1809	1756	1669	1891	1778	1836	1734	1794	1749	1917	1888	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clarificador	3413	3219	3424	3498	3589	3461	3167	3326	3575	3361	3499	3374	3342	3358	3047	3600	3074	3482	3337	3521	5759	3425	3134	3598	3351	3289	2574	3340	3545	3427	3127
CAUDAL PROYECTADO (gpm)																															
Portal Este (tubería 6")	27	34	59	66	82	125	104	86	82	95	134	59	48	49	53	73	58	20	0	0	0	0	0	0	0	0	0	0	0	44	
Total Este (tubería 8")	216	114	124	141	81	55	41	47	50	42	0	118	107	92	103	63	102	174	217	179	0	65	144	150	157	174	222	195	226	205	126
Portal Oeste (tubería 6")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	329	338	332	322	306	347	326	337	318	329	321	351	346	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clarificador	626	590	628	641	658	635	581	610	655	616	641	619	613	616	559	660	564	638	612	646	1056	628	575	660	614	603	472	612	650	628	573

m³: metro cúbico. Gpm: galones por minuto. Fuente: MSR, 2016.

Junio 2016																																
Descarga/fecha	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
LECTURA FLUJÓMETRO (m³)																																
Portal Este (tubería 6")	190861.2	191024.4	191207	191230.4	191362	191362.7	191363	191363.2	191366.8	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.3	191369.4	191369.4
Total Este (tubería 8")	190253.7	191035.3	191817.7	192426.6	192581.1	192591.9	192605.7	193113	193789.2	194049	194426	194672	194740	194941	195122	195443.7	195535.6	196254.9	196626.3	196962.7	197313.8	197409.8	197457.5	197700.8	197777.4	198041.2	198239.4	198847.8	199338.8	199747.4	199747.4	
Portal Oeste (tubería 6")	422401	424153	425920	427650	429445	431008	432803	434580	436405	438290	440166	441994	443812	445527	447337	449084	450826	452620	454327	455903	457709	459270	461198	462969	464828	466704	468377	470134	471872	473071	473071	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clarificador	4277479	4280843	4283707	4286684	4289873	4292944	4295966	4298885	4301909	4304760	4307723	4310971	4314115	4317310	4320764	4324035	4327387	4330420	4334616	4337795	4341191	4344338	4347943	4350813	4354404	4357404	4360575	4363799	4367180	4371095	4371095	
VOLUMEN BOMBEADO (m³)																																
Portal Este (tubería 6")	190	163	182	24	132	1	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Este (tubería 8")	874	782	782	609	154	11	14	507	676	260	377	246	68	201	181	322	92	719	371	336	351	96	48	243	77	264	198	608	491	409	409	
Portal Oeste (tubería 6")	1710	1752	1767	1731	1795	1564	1795	1777	1825	1885	1876	1828	1818	1715	1810	1747	1742	1794	1708	1575	1807	1561	1928	1771	1859	1876	1673	1757	1738	1199	1199	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clarificador	3280	3364	2864	2977	3189	3071	3022	2919	3024	2851	2963	3248	3144	3195	3454	3271	3352	3033	4196	3179	3396	3147	3605	2870	3591	3000	3171	3224	3381	3915	3915	
CAUDAL PROYECTADO (gpm)																																
Portal Este (tubería 6")	35	30	33	4	24	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Este (tubería 8")	160	143	143	112	28	2	3	93	124	48	69	45	13	37	33	59	17	132	68	62	64	18	9	45	14	48	36	112	90	75	75	
Portal Oeste (tubería 6")	313	321	324	317	329	287	329	326	335	346	344	335	333	314	332	320	319	329	313	289	331	286	353	325	341	344	307	322	319	220	220	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clarificador	601	617	525	546	585	563	554	535	554	523	543	595	576	586	633	600	615	556	769	583	623	577	661	526	658	550	581	591	620	718	718	

m³: metro cúbico. Gpm: galones por minuto. Fuente: MSR, 2016.

Julio 2016																																
Descarga/fecha	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
LECTURA FLUJÓMETRO (m³)																																
Portal Este (tubería 6")	191369	191369.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4	191374.4
Total Este (tubería 8")	199880.7	200257.9	200393	200459.6	200713.2	200774.5	201252.3	201519	201704	202066	202363	202795	203271.3	203575.9	203856.3	216257.8	229885.1	243512.5	257139.8	258025.6	258253.2	258374.1	258614.3	259098.3	259361.5	259635.7	259916.5	260142.2	260517.4	260918.2	261246.3	
Portal Oeste (tubería 6")	474537	476287	477994	479765	481591	483327	484341	485625	487320	489086	490680	492309	493876	495550	497195	498852	500653	502531	504386	506102	507922	509631	511351	513041	514747	516404	518077	519819	521516	523180	524752	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Clarificador	4374215	4377597	4380830	4383636	4387040	4390478	4393838	4397070	4400155	4403127	4406326	4409381	4413056	4416287	4419807	4423485	4426878	4430470	4433623	4436772	4439425	4442145	4445761	4459428	4463164	4485198	4494612	4497890	4509796	4515837	4520984	
VOLUMEN BOMBEADO (m³)																																
Portal Este (tubería 6")	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Este (tubería 8")	133	377	135	67	254	61	478	266	186	362	297	432	476	305	280	12402	13627	13627	13627	886	228	121	240	484	263	274	281	226	375	401	328	
Portal Oeste (tubería 6")	1466	1750	1707	1772	1826	1736	1014	1284	1695	1766	1594	1629	1567	1674	1646	1657	1801	1877	1855	1717	1819	1709	1720	1690	1706	1657	1673	1742	1696	1664	1572	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Clarificador	3120	3382	3233	2806	3404	3438	3360	3232	3085	2972	3199	3055	3675	3231	3520	3678	3393	3592	3153	3149	2653	2720	3616	13667	3736	22034	9414	3278	11906	6041	5147	
CAUDAL PROYECTADO (gpm)																																
Portal Este (tubería 6")	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Este (tubería 8")	24	69	25	12	46	11	88	49	34	66	54	79	87	56	51	2274	2498	2498	2498	162	42	22	44	89	48	50	51	41	69	73	60	
Portal Oeste (tubería 6")	269	321	313	325	335	318	186	235	311	324	292	299	287	307	302	304	330	344	340	315	334	313	315	310	313	304	307	319	311	305	288	
Portal Oeste (tubería 8")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Clarificador	572	620	593	514	624	630	616	593	566	545	586	560	674	592	645	674	622	659	578	577	486	499	663	2506	685	4040	1726	601	2183	1108	944	

m³: metro cúbico. Gpm: galones por minuto. Fuente: MSR, 2016.

11.2 Análisis In Situ y kit de cianuro (CN) en efluentes

Mayo 2016																																				
Parámetro	Unidades	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Efluente Planta de Tratamiento Agua de Túneles (WW9)																																				
pH	u.e.	7.41	7.44	6.74	7.32	7.39	7.25	7.3	7.3	7.22	8.13	7.22	Sin Descarga	7.36	Sin Descarga	6.94	Sin Descarga	7.31	6.65	7.21	7.3	7.15	7.06	Sin Descarga	7.13	6.85	7.19	Sin Descarga	7	7.25						
Temperatura	°C	26	27.1	26.5	25.8	26.3	25.8	29.2	26.9	26.3	27	26.1		27.7		27.5		26.8	27.9	26.8	29.9	26.1	25.5		30.1	27	27.1		25	25.9						
Conductividad	µS/cm	1713	1750	1720	1746	2005	2022	1979	2049	2105	2065	2045		2080		1933		1892	1957	1946	2026	1984	2039		14.6	9.41	6.47		404.3	1699						
Turbidez	NTU	3.55	3.44	3.86	6.17	11.1	9.97	9.21	3.99	12.2	5.47	5.61		0.95		4.2		9.4	4.54	6.28	15.8	2.92	7.72		14.6	9.41	6.47		6.39	6.39						
kit CN	mg/L	0.003	0.002	0.003	0.004	0.005	0.006	0.004	0.005	0.000	0.007	0.000		0.004		0.000		0.004	0.005	0.008	0.006	0.005	0.005		0.010	0.002	0.003		0.003	0.003						
CN Total	mg/L	<0.003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		NA	0.008	NA	NA	0.008	NA		0.004	NA	NA		NA	<0.003	NA	NA	<0.003	NA	NA	
Pileta de Cumplimiento Ambiental (EP-3 o pileta 3)																																				
pH	u.e.	Sin agua										7.22	Sin agua										7.4	7.07	7.23	7.56	7.63	7.64	7.3	7.12	7.55	8.04	8.52	8.7	8.99	8.93
Temperatura	°C											24.3											25.8	24.8	25.1	25.5	24.3	24.4	26.1	23.8	24.8	27.4	25.3	26	25	26.1
Conductividad	µS/cm											193.8											163	359.4	132.1	135.1	142.9	266.1	188.9	248.4	205.4	213.1	246.6	235.4	NA	254.6
Turbidez	NTU											114											184	141	91	69.6	61.3	81.5	89.3	94.6	107	99.1	89.4	76.9	74.1	71.6
Kit CN	mg/L											0.003											0.003	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.001	0.008	0.000	0.000	0.021	0.020
CN Total	mg/L											0.004											NA	<0.003	NA	NA	NA	<0.003	NA	NA	<0.003	NA	NA	<0.003	NA	NA

u.e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NTU: unidades naftalométricas de turbidez. NA: no analizado. Fuente: MSR, 2016.

Junio 2016																															
Parámetro	Unidades	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Efluente Planta de Tratamiento Agua de Túneles (WW9)																															
pH	u.e.	7.8		7	7.42		7.4	7.05	6.76	6.8	7.06	7.28	6.81	6.19	7.41	7.2	7.53	7.37	7.48	7.54	7.39		7.23	7.18	6.98	6.92	7.17	7.19	7.19	7.06	7.37
Temperatura	°C	27.1		26.3	26		25.4	28.2	26.3	25.6	27.4	26.2	28	26.6	26.1	27	27.1	26.3	25.4	25.9	24.9		27.1	26.3	25.5	25.9	28.5	26.9	27.2	26.7	23.2
Conductividad	µS/cm	1677		1814	1707		1846	1721	1820	1837	1743	1958	1945	1807	1891	1831	1716	1777	605.1	1668	1751		1672	1730	1731	1974	1618	2041	1980	1828	2106
Turbidez	NTU	10.2		9.85	10.5		11.1	5.33	3.56	4.25	8.58	4.12	6.07	5.92	6.42	8.82	5.71	14.3	10	15.7	8.52		10.7	3.17	9.91	5.83	7.55	6.22	4.95	9.03	6.19
kit CN	mg/L	0.019		0.004	0.000		0.005	0.001	0.005	0.000	0.001	0.006	0.002	0.005	0.005	0.002	0.004	0.008	0.004	0.001	0.005		0.010	0.002	0.004	0.004	0.004	0.005	0.005	0.002	0.000
CN Total		NA		NA	NA		NA	0.003	NA	NA	<0.003	NA	NA	<0.003	NA	NA	<0.003	NA	NA	<0.003	NA		NA	<0.003	NA	NA	NA	NA	NA	NA	NA
Pileta de Cumplimiento Ambiental (EP-3 o pileta 3)																															
pH	u.e.	8.74	8.64	7.92	7.68	8.05	7.8	7.95	8.36	8.31	8.23	8.36	8.06	7.48	8	7.52	7.57	7.57	7.36	7.62	7.65		7.79	7.52	7.44	7.55	7.64	7.64	7.54	7.74	7.41
Temperatura	°C	24.1	27.3	25	24	24.9	24.4	25.3	23.5	24.6	26.1	26.8	24.9	22.3	25.3	23.6	25.1	25.3	23.4	25.3	24.9		22.9	24.9	24	25.2	23.4	24.3	22	23.9	22.5
Conductividad	µS/cm	201	192.7	164.4	162.6	434.4	258.7	259.9	260.4	249.4	255.6	722.3	322.3	214.6	268.3	1156	201.6	211.7	152	149.4	144.2		500.2	403.7	407.2	546	440.8	569.6	538.2	537.7	543.7
Turbidez	NTU	61.5	55.9	44.5	42.6	39.8	34.6	25.3	25.1	22.2	19.3	18.2	17.6	16.2	14.2	18	7.94	9.34	14	12.5	9.74		6.1	6.91	7.43	5.67	5.74	5.38	4.15	3.49	5.72
Kit CN	mg/L	0.002	0.003	0.003	0.002	0.009	0.009	0.003	0.002	0.002	0.001	0.000	0.001	0.006	0.004	0.004	0.001	0.001	0.001	0.002	0.000		0.002	0.001	0.002	0.002	0.002	0.001	0.002	0.001	0.010
CN Total		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.003	NA	<0.003	NA	NA	NA	<0.003	NA	NA	NA	NA		NA	0.006	NA	NA	0.007	NA	NA	NA

u.e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NTU: unidades naftalométricas de turbidez. NA: no analizado. Fuente: MSR, 2016.

Julio 2016																																
Parámetro	Unidades	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Efluente Planta de Tratamiento Agua de Túneles (WW9)																																
pH	u.e.	7.01	6.44	7.23	6.63	7.27	7.45	7.27	6.91	7.22	7.47	7.31	7.33	7	7.16	7.17	7.07	7.2		7.59	7.71	7.71	7.53	7.66	7.94	7.65	7.62	7.07	7.05	7.13	7.21	7.07
Temperatura	°C	28.2	26.8	25.3	26.7	25.7	24.3	25	26.3	26.5	26.6	25.8	25.3	26.2	28.7	27.1	25.9	25.9		22	25.5	27.6	25.9	25.1	27.1	26.2	25.7	27.5	27.9	26.6	25.8	27.6
Conductividad	µS/cm	1565	2014	2142	1706	1714	1399	1643	1657	1637	1883	2904	1614	1572	2183	1593	1808	1664		2404	2124	2235	2493	2107	2015	1985	2186	2036	1986	1892	1968	1884
Turbidez	NTU	6.48	5.43	12.8	11	4.7	14.5	3.96	6.34	5.98	7.97	13.4	5.2	4.6	5.23	5.47	5.23	3.13		1.39	13.4	19.2	4.63	4.2	6.46	8.6	5.66	8.38	18.1	14.2	5.35	12.1
kit CN	mg/L	0.015	0.001	0.001	0.003	0.005	0.002	0.005	0.001	0.009	0.006	0.004	0.015	0.003	0.002	0.005	0.005	0.003		0.009	0.006	0.003	0.002	0.009	0.004	0.003	0.012	0.030	0.080	0.006	0.005	0.002
CN Total		<0.003	NA	<0.003	<0.003	NA	NA	NA	<0.003	NA	NA	0.005	NA	NA	NA	<0.003	NA	<0.003		NA	NA	NA	<0.003	NA	NA	0.007	NA	NA	NA	<0.003	NA	<0.003
Pileta de Cumplimiento Ambiental (EP-3 o pileta 3)																																
pH	u.e.	7.58	7.58	7.63	7.82	7.64	7.73	7.79	7.72	7.94	7.98	8.01	8.06	8.04	8.09	8.09	7.93	8.06	7.98	8.16	7.94	8.04	8.13	8.1	7.85	7.78	8.27	7.84	7.65	6.48	7.82	7.82
Temperatura	°C	23.7	24.3	22	23.2	23.9	24.4	25.2	30.2	24.1	22.7	22.7	23.3	23.6	22.9	21.7	21.9	23.7	24.3	24.9	22.8	23.3	23.1	23.2	23.6	23.6	23.4	24.3	24.5	21.9	23.9	22.4
Conductividad	µS/cm	554.1	653.5	564	466.3	458	665.6	471.9	2890	466.8	463.9	576.9	481.1	727.2	542.9	549.1	554.8	723	997.4	826	764.5	688.3	677.3	708.8	636.4	631.7	639.7	633	675.3	479.4	618.3	628.1
Turbidez	NTU	3.48	3.41	2.82	3.1	3.7	1.73	1.82	6.71	2.52	2.17	4.33	3.06	2.69	3.03	1.93	2.77	2.09	2.15	2.65	3.82	3.49	4.04	3.83	4.6	2.8	2.32	2.57	2.94	4.29	3.29	3.19
kit CN	mg/L	0.008	0.002	0.004	0.002	0.002	0.005	0.001	0.006	0.002	0.002	0.003	0.004	0.001	0.001	0.003	0.002	0.001	0.005	0.001	0.002	0.002	0.001	0.004	0.001	0.001	0.002	0.001	0.001	0.000	0.002	0.001
CN Total		0.003	NA	NA	<0.003	NA	NA	NA	<0.003	NA	<0.003	NA	NA	NA	NA	0.005	NA	NA	NA	NA	NA	NA	0.004	NA	0.003	NA	NA	NA	NA	0.004	NA	NA

u.e.: unidades exponenciales. mg/L: miligramos por litro. µS/cm: micro siemens por centímetro. °C: grados centígrados. NTU: unidades naftalométricas de turbidez. NA: no analizado. Fuente: MSR, 2016.

Con el objetivo de verificar si los resultados obtenidos con el método colorimétrico empleado para la determinación rápida de Cianuro (kit de CN), desde el mes de Octubre 2013 se enviaron varias muestras duplicado al laboratorio ACZ para realizar análisis de Cianuro Total.

Según los resultados obtenidos, con el kit colorimétrico se obtienen resultados no confiables debido a que presentan una gran desviación positiva con respecto a los resultados obtenidos en el laboratorio acreditado. Como medida correctiva se investigarán las fuentes de dicha desviación; entre las cuales se contemplan la contaminación cruzada, sustancias contenidas en las aguas analizadas que puedan interferir en el análisis, error humano al realizar el análisis, entre otras. Se realizarán los cambios necesarios para obtener resultados más confiables.

11.3 Resultados crudos de calidad de aire

11.3.1 Material Particulado (PM₁₀)

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-1A
Version: PQ100
Serial No: 4.00
Pump Time:
Flags: NA

Job Code: EA-1A
Site Name: Los Planes (Top Soil Deposit)
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	645	644	644	mmHg
TA	28.8	27.8	28.3	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	10-May-16	10:15:00
Stop:	11-May-16	10:15:00

Mass Concentration Data:

Filter ID:	3008-1515
Final Wt:	151.470 mg
Initial Wt:	150.770 mg
Delta Wt:	0.700 mg
Total Vol:	20.17 m ³

QCV	NA	%
Max overheat	NA	°C

occured NA

ET: 23:59:00

Mass Conc: 34.71 µg/m³

Notes 1: Depósito de Suelos, Proyecto El Escobal

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-1B
Version: PQ100
Serial No: 6.00
Pump Time:
Flags: NA

Job Code: EA-1B
Site Name: San Rafael Las Flores
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	645	644	645	mmHg
TA	28.8	27.8	28.3	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	24-May-16	12:20:00
Stop:	25-May-16	12:20:00

Mass Concentration Data:

Filter ID:	2999-0505
Final Wt:	151.290 mg
Initial Wt:	150.180 mg
Delta Wt:	1.110 mg
Total Vol:	20.20 m ³

QCV	NA	%
Max overheat	NA	°C

occured NA

ET: 23:59:00

Mass Conc: 54.96 µg/m³

Notes 1: San Rafael Las Flores, Santa Rosa.

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-2A
Version: PQ200
Serial No: 1.00
Pump Time:
Flags: NA

Job Code: EA-2A
Site Name: La Cuchilla.
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	634	628	632	mmHg
TA	30.9	17.8	22.4	°C
Q	---	---	16.70	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	12-May-16	16:55:00
Stop:	13-May-16	16:55:00

Mass Concentration Data:

Filter ID:	3000-0606
Final Wt:	150.330 mg
Initial Wt:	149.320 mg
Delta Wt:	1.010 mg
Total Vol:	20.17 m ³

QCV	NA	%
Max overheat	NA	°C

occured NA

ET: 23:59:00

Mass Conc: 50.06 µg/m³

Notes 1: Aldea La Cuchilla, San Rafael Las Flores, Santa Rosa.

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-3
Version: PQ200
Serial No: 2.00
Pump Time:
Flags: NA

Job Code: EA-3
Site Name: El Fucío, zona este.
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	628	624	626	mmHg
TA	29.5	17.2	21.7	°C
Q	---	---	16.70	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	16-May-16	11:23:00
Stop:	17-May-16	11:23:00

Mass Concentration Data:

Filter ID:	3001-0707
Final Wt:	151.230 mg
Initial Wt:	150.200 mg
Delta Wt:	1.030 mg
Total Vol:	20.03 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 51.42 µg/m³

Notes 1: Aldea El Fucío, San Rafael Las Flores, Santa Rosa.

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-3A
Version: PQ100
Serial No: 6.00
Pump Time:
Flags: NA

Job Code: EA-3A
Site Name: Aldea El Fucío
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	640	639	639	mmHg
TA	28.7	25.3	25.3	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	26-May-16	16:38:00
Stop:	27-May-16	16:38:00

Mass Concentration Data:

Filter ID:	3002-0808
Final Wt:	151.700 mg
Initial Wt:	150.480 mg
Delta Wt:	1.220 mg
Total Vol:	20.21 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 60.36 µg/m³

Notes 1: Aldea El Fucío, San Rafael Las Flores, Santa Rosa.

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-4A
Version: PQ200
Serial No: 2.00
Pump Time:
Flags: NA

Job Code: EA-4A
Site Name: Aldea Los Ángeles
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	650	644	648	mmHg
TA	30.5	16.2	22.0	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	31-May-16	14:43:00
Stop:	1-Jun-16	14:43:00

Mass Concentration Data:

Filter ID:	3003-1010
Final Wt:	151.730 mg
Initial Wt:	150.450 mg
Delta Wt:	1.280 mg
Total Vol:	20.73 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 61.76 µg/m³

Notes 1: Caserío El Portón de los Ángeles, San Rafael Las Flores, Santa Rosa

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-5A
Version: PQ100
Serial No: 6.00
Pump Time:
Flags: NA

Job Code: EA-5A
Site Name: Sabana Redonda
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	646	645	645	mmHg
TA	33.8	32.8	33.3	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	31-May-16	15:37:00
Stop:	1-Jun-16	15:37:00

Mass Concentration Data:

Filter ID:	3004-1111
Final Wt:	151.410 mg
Initial Wt:	150.500 mg
Delta Wt:	0.910 mg
Total Vol:	19.87 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 45.80 µg/m³

Notes 1: Aldea Sabana Redonda, San Rafael Las Flores, Santa Rosa

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-6
Version: PQ200
Serial No: 3.00
Pump Time:
Flags: NA

Job Code: EA-6
Site Name: Carretera a Mataquesquintla
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	645	640	644	mmHg
TA	32.2	18.6	23.0	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	24-May-16	13:00:00
Stop:	25-May-16	13:00:00

Mass Concentration Data:

Filter ID:	3005-1212
Final Wt:	152.690 mg
Initial Wt:	151.580 mg
Delta Wt:	1.110 mg
Total Vol:	20.53 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 54.07 µg/m³

Notes 1: Carretera a Mataquesquintla, al norte del Proyecto, San Rafael Las Flores Santa Rosa

Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded May 2016

Job Details:

Job Name: EA-7A
Version: PQ200
Serial No: 2.00
Pump Time:
Flags: NA

Job Code: EA-7A
Site Name: Los Planes
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	652	645	650	mmHg
TA	32.0	18.5	23.4	°C
Q	---	---	16.71	Lpm

Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	19-May-16	15:23:00
Stop:	20-May-16	15:23:00

Mass Concentration Data:

Filter ID:	3009-1616
Final Wt:	151.280 mg
Initial Wt:	150.760 mg
Delta Wt:	0.520 mg
Total Vol:	20.69 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 25.13 µg/m³

Notes 1: Aldea Los Planes, San Rafael Las Flores, Santa Rosa.

Notes 2: Minera San Rafael, S.A.

Cliente: Minera San Rafael, S.A.
Dirección: Boulevard Los Próceres, 18 calle 24-69 z. 10, Centro Empresarial Zona Pradera, Oficina 1406 torre IV
Proyecto: 178-079 (El Escobal)
Análisis de muestras: Junio, 13 al 15 de 2016
Emisión de reporte: Junio, 16 de 2016

Tipo de muestra: Filtros de cuarzo utilizados para colección de material particulado en aire.

Análisis: Gravimetría en filtros.

Método analítico: 40 CFR, Apéndice J, Parte 50, Capítulo 1, Edición 07-1-97, EPA. Reference Method for the Determination of Particulate Matter as PM₁₀ in the Atmosphere. **Acreditado ISO 17025**

Cuadro 1: resultados de filtros peso final

No.	Identificación de la muestra	Código de filtro ¹	Peso inicial* (gramos)	Peso final (gramos)
Límite de detección del método			0.00005	
1	EA-1A	3008-1515	0.15077	0.15147
2	EA-1B	2999-0505	0.15018	0.15129
3	EA-2A	3000-0606	0.14932	0.15033
4	EA-3	3001-0707	0.15020	0.15123
5	EA-3A	3002-0808	0.15048	0.15170
6	EA-4A	3003-1010	0.15045	0.15173
7	EA-5A	3004-1111	0.15050	0.15141
8	EA-6	3005-1212	0.15158	0.15269
9	EA-7A	3009-1616	0.15076	0.15128
10	EA-10	3010-1717	0.15077	0.15081

¹: Código de filtro asignado por Laboratorio Ambiental, S.A. *: Corresponde a los pesos iniciales indicado en reportes analíticos RA-16-11556 y RA-16-11557.

Anexos:

Anexo 1. Cadena de Custodia R-02-000781

Este Reporte Analítico ha sido elaborado para uso confidencial y exclusivo del cliente; se prohíbe su reproducción, sin la aprobación escrita del Laboratorio. Los resultados aquí expresados representan el mejor juicio del Laboratorio y son válidos únicamente para la porción de muestra presentada a éste. Laboratorio Ambiental, S.A. no asume ninguna responsabilidad ni garantiza la utilización final que se le dé a la información aquí presentada. Laboratorio Ambiental, S.A. no se responsabiliza por el proceso de muestreo. En caso de requerir alguna modificación en este reporte analítico, solicitarla dentro de los siguientes 30 días a partir de la fecha en que el Laboratorio envió el reporte.

Lic. Levis Donado

Lic. Químico Encargado Químico
Colegiado 4480

MSc. BSc. Ana Gabriela Juárez

Especialista ambiental, Director de Laboratorio

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
L.D.	Junio, 16/16	J.J.	Junio, 16/16	A.G.J.	Junio, 16/16	01

BGI PQ200 Air Sampling System

Downloaded June 2016

Job Details:

Job Name: EA-1A
Version: PQ200
Serial No: 2.00
Pump Time:
Flags: NA

Job Code: EA-1A
Site Name: Los Planes (Top Soil Deposit)
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	654	649	652	mmHg
TA	28.7	14.4	20.2	°C
Q	---	---	16.71	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start: 15-Jun-16	15:46:00
Stop: 16-Jun-16	15:46:00
ET: 23:59:00	

Mass Concentration Data:	
Filter ID:	3029-0202
Final Wt:	151.310 mg
Initial Wt:	150.750 mg
Delta Wt:	0.560 mg
Total Vol:	24.04 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Mass Conc: **23.29** µg/m³

Notes 1: Depósito de Suelos, Proyecto El Escobal
Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded June 2016

Job Details:

Job Name: EA-2A
Version: PQ200
Serial No: 1.00
Pump Time:
Flags: NA

Job Code: EA-2A
Site Name: La Cuchilla.
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	635	632	633	mmHg
TA	29.0	17.5	20.8	°C
Q	---	---	16.71	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start: 23-Jun-16	12:55:00
Stop: 24-Jun-16	12:55:00
ET: 23:59:00	

Mass Concentration Data:	
Filter ID:	3025-1525
Final Wt:	151.700 mg
Initial Wt:	151.360 mg
Delta Wt:	0.340 mg
Total Vol:	19.92 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Mass Conc: **17.07** µg/m³

Notes 1: Aldea La Cuchilla, San Rafael Las Flores, Santa Rosa.
Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded June 2016

Job Details:

Job Name: EA-3
Version: PQ200
Serial No: 2.00
Pump Time:
Flags: NA

Job Code: EA-3
Site Name: El Fucío, zona este.
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	629	626	627	mmHg
TA	24.3	16.9	19.8	°C
Q	---	---	16.70	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start: 23-Jun-16	11:40:00
Stop: 24-Jun-16	11:40:00
ET: 23:59:00	

Mass Concentration Data:	
Filter ID:	3026-1616
Final Wt:	152.020 mg
Initial Wt:	151.670 mg
Delta Wt:	0.350 mg
Total Vol:	20.19 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Mass Conc: **17.33** µg/m³

Notes 1: Aldea El Fucío, San Rafael Las Flores, Santa Rosa.
Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded June 2016

Job Details:

Job Name: EA-7A
Version: PQ200
Serial No: 1.00
Pump Time:
Flags: NA

Job Code: EA-7A
Site Name: Los Planes
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	649	655	652	mmHg
TA	28.0	14.9	20.7	°C
Q	---	---	16.71	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start: 15-Jun-16	15:27:00
Stop: 16-Jun-16	15:27:00
ET: 23:59:00	

Mass Concentration Data:	
Filter ID:	3024-1424
Final Wt:	151.310 mg
Initial Wt:	150.780 mg
Delta Wt:	0.530 mg
Total Vol:	24.04 m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Mass Conc: **22.05** µg/m³

Notes 1: Aldea Los Planes, San Rafael Las Flores, Santa Rosa.
Notes 2: Minera San Rafael, S.A.

Cliente: Minera San Rafael, S.A.
Dirección: Boulevard Los Próceres, 18 calle 24-69 z. 10, Centro Empresarial Zona Pradera, Oficina 1406 torre IV
Proyecto: 178-079 (El Escobal)
Análisis de muestras: Julio, 08 al 12 de 2016
Emisión de reporte: Julio, 12 de 2016

Tipo de muestra: Filtros de cuarzo utilizados para colección de material particulado en aire.

Análisis: Gravimetría en filtros.

Método analítico: 40 CFR, Apéndice J, Parte 50, Capítulo 1, Edición 07-1-97, EPA. Reference Method for the Determination of Particulate Matter as PM₁₀ in the Atmosphere. **Acreditado ISO 17025**

Cuadro 1: resultados de filtros peso final

No.	Identificación de la muestra	Código de filtro ¹	Peso inicial* (gramos)	Peso final (gramos)
Límite de detección del método			0.00005	
1	EA-1A	3029-0202	0.15075	0.15131
2	EA-2A	3025-1525	0.15136	0.15170
3	EA-3	3026-1616	0.15167	0.15202
4	EA-7A	3024-1424	0.15078	0.15131

¹: Código de filtro asignado por Laboratorio Ambiental, S.A. *: Corresponde a los pesos iniciales indicado en reportes analíticos RA-16-11570.

Anexos:

Anexo 1. Cadena de Custodia R-02-000784

Este Reporte Analítico ha sido elaborado para uso confidencial y exclusivo del cliente; se prohíbe su reproducción, sin la aprobación escrita del Laboratorio. Los resultados aquí expresados representan el mejor juicio del Laboratorio y son válidos únicamente para la porción de muestra presentada a éste. Laboratorio Ambiental, S.A. no asume ninguna responsabilidad ni garantiza la utilización final que se le dé a la información aquí presentada. Laboratorio Ambiental, S.A. no se responsabiliza por el proceso de muestreo. En caso de requerir alguna modificación en este reporte analítico, solicitarla dentro de los siguientes 30 días a partir de la fecha en que el Laboratorio envió el reporte.

Ing. Diego Silva
Ingeniero Químico, Gestor de Calidad
Colegiado 1595

MSc. BSc. Ana Gabriela Juárez
Especialista ambiental, Director de Laboratorio

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
L.D.	Julio, 12/16	D.S.	Julio, 12/16	A.G.J.	Julio, 12/16	01

BGI PQ200 Air Sampling System

Downloaded July 2016

Job Details:

Job Name: EA-1A
Version: PQ200
Serial No: 3.00
Pump Time:
Flags: NA

Job Code: EA-1A
Site Name: Los Planes (Top Soil Deposit)
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	648	652	650	mmHg
TA	29.2	16.6	21.7	°C
Q	---	---	16.71	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start:	12-Jul-16 10:58:00
Stop:	13-Jul-16 10:58:00
ET:	23:59:00

Mass Concentration Data:	
Filter ID:	3033-0606
Final Wt:	151.530 mg
Initial Wt:	151.000 mg
Delta Wt:	0.530 mg
Total Vol:	24.04 m ³
Mass Conc:	22.05 µg/m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Notes 1: Depósito de Suelos, Proyecto El Escobal
Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded July 2016

Job Details:

Job Name: EA-2A
Version: PQ200
Serial No: 1.00
Pump Time:
Flags: NA

Job Code: EA-2A
Site Name: La Cuchilla.
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	635	631	633	mmHg
TA	28.6	16.3	19.9	°C
Q	---	---	16.71	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start:	19-Jul-16 12:07:00
Stop:	20-Jul-16 12:07:00
ET:	23:59:00

Mass Concentration Data:	
Filter ID:	3041-1414
Final Wt:	151.790 mg
Initial Wt:	151.460 mg
Delta Wt:	0.330 mg
Total Vol:	19.92 m ³
Mass Conc:	16.57 µg/m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Notes 1: Aldea La Cuchilla, San Rafael Las Flores, Santa Rosa.
Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded July 2016

Job Details:

Job Name: EA-3
Version: PQ200
Serial No: 2.00
Pump Time:
Flags: NA

Job Code: EA-3
Site Name: El Fucío, zona este.
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	629	625	626	mmHg
TA	23.5	15.8	19.1	°C
Q	---	---	16.70	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start:	19-Jul-16 10:25:00
Stop:	20-Jul-16 10:25:00
ET:	23:59:00

Mass Concentration Data:	
Filter ID:	3040-1313
Final Wt:	151.050 mg
Initial Wt:	150.830 mg
Delta Wt:	0.220 mg
Total Vol:	20.21 m ³
Mass Conc:	10.89 µg/m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Notes 1: Aldea El Fucío, San Rafael Las Flores, Santa Rosa.
Notes 2: Minera San Rafael, S.A.

BGI PQ200 Air Sampling System

Downloaded July 2016

Job Details:

Job Name: EA-7A
Version: PQ200
Serial No: 3.00
Pump Time:
Flags: NA

Job Code: EA-7A
Site Name: Los Planes
Station Code:
Operators: EvQ
User1: NA
User2: NA

	Max	Min	Avg	Units
BP	653	649	651	mmHg
TA	30.0	18.6	22.8	°C
Q	---	---	16.71	Lpm

Timer Information:	
Date	Time
dd-mmm	hh:mm:ss
Start:	14-Jul-16 13:52:00
Stop:	15-Jul-16 13:52:00
ET:	23:59:00

Mass Concentration Data:	
Filter ID:	3034-0707
Final Wt:	151.160 mg
Initial Wt:	150.140 mg
Delta Wt:	1.020 mg
Total Vol:	24.04 m ³
Mass Conc:	42.43 µg/m ³

QCV	NA	%
Max overheat	NA	°C
occured NA		

Notes 1: Aldea Los Planes, San Rafael Las Flores, Santa Rosa.
Notes 2: Minera San Rafael, S.A.

Cliente:	Minera San Rafael, S.A.
Dirección:	Boulevard Los Próceres, 18 calle 24-69 z. 10, Centro Empresarial Zona Pradera, Oficina 1406 torre IV
Proyecto:	178-079 (El Escobal)
Análisis de muestras:	Agosto, 03 al 05 de 2016
Emisión de reporte:	Agosto, 09 de 2016

Tipo de muestra:	Filtros de cuarzo utilizados para colección de material particulado en aire.
Análisis:	Gravimetría en filtros.
Método analítico:	40 CFR, Apéndice J, Parte 50, Capítulo 1, Edición 07-1-97, EPA. Reference Method for the Determination of Particulate Matter as PM ₁₀ in the Atmosphere. Acreditado ISO 17025

Cuadro 1: resultados de filtros peso final

No.	Identificación de la muestra	Código de filtro ¹	Peso inicial* (gramos)	Peso final (gramos)
Límite de detección del método			0.00005	
1	EA-1A	3033-0606	0.15100	0.15153
2	EA-2A	3041-1414	0.15146	0.15179
3	EA-3	3040-1313	0.15083	0.15105
4	EA-7A	3034-0707	0.15014	0.15116

¹: Código de filtro asignado por Laboratorio Ambiental, S.A. *: Corresponde a los pesos iniciales indicado en reportes analíticos RA-16-11581.

Anexos:

Anexo 1. Cadena de Custodia R-02-000787

Este Reporte Analítico ha sido elaborado para uso confidencial y exclusivo del cliente; se prohíbe su reproducción, sin la aprobación escrita del Laboratorio. Los resultados aquí expresados representan el mejor juicio del Laboratorio y son válidos únicamente para la porción de muestra presentada a éste. Laboratorio Ambiental, S.A. no asume ninguna responsabilidad ni garantiza la utilización final que se le dé a la información aquí presentada. Laboratorio Ambiental, S.A. no se responsabiliza por el proceso de muestreo. En caso de requerir alguna modificación en este reporte analítico, solicitarla dentro de los siguientes 30 días a partir de la fecha en que el Laboratorio envió el reporte.

Ing. Diego Silva
Ingeniero Químico, Gestor de Calidad
Colegiado 1595

MSc. BSc. Ana Gabriela Juárez
Especialista ambiental, Director de Laboratorio

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
J.J.	Agosto, 09/16	L.D.	Agosto, 09/16	A.G.J.	Agosto, 10/16	01

11.3.2 Informe de Metales en PM₁₀

Reporte Analítico RA-16-11574

Cliente: Minera San Rafael
Dirección: Boulevard Los Próceres, 18 calle 24-69 z. 10, Centro Empresarial
Zona Pradera, Oficina 1406 torre IV
Proyecto: 178-080
Análisis de muestras: Julio, 07 de 2016
Emisión del reporte: Julio, 11 de 2016

Tipo de muestras: Filtros de cuarzo utilizados para colección de material particulado en aire.

Análisis: Mercurio en filtros por ICP de Masas.

Método analítico: ICP Masas. EPA 7470 Mercury by CV/AA

*Parámetros	LDM (µg)	Estación							
		EA-1B	EA-2A	EA-3A	EA-4A	EA-5A	EA-6	EA-7A	EA-10
Código de filtro		2999-0505	3000-0606	3002-0808	3003-1010	3004-1111	3005-1212	3009-1616	3010-1717
Mercurio (Hg)	0.002	0.007	0.005	0.012	0.008	0.007	0.008	0.006	0.005

*: Análisis realizados por laboratorio subcontratado (laboratorio acreditado CAN-P-1585, CAN-P-1587, CAN-P-4E (ISO/IEC 17025:2005)). µg: microgramos. <: Menor que el límite de detección del método. **LDM:** límite de detección del método.

Anexos:

- Anexo 1. Cadena de Custodia R-02-000781
- Anexo 2. Reporte de Laboratorio Subcontratado

Este Reporte Analítico ha sido elaborado para uso confidencial y exclusivo del cliente; se prohíbe su reproducción, sin la aprobación escrita del Laboratorio. Los resultados aquí expresados representan el mejor juicio del Laboratorio y son válidos únicamente para la porción de muestra presentada a éste. Laboratorio Ambiental, S.A. no asume ninguna responsabilidad ni garantiza la utilización final que se le dé a la información aquí presentada. Laboratorio Ambiental, S.A. no se responsabiliza por el proceso de muestreo. En caso de requerir alguna modificación en este reporte analítico, solicitarla dentro de los siguientes 30 días a partir de la fecha en que el Laboratorio envió el reporte

Ing. Diego Silva
Ing. Químico, Gestor de Calidad
Colegiado 1595

MSc. BSc. Ana Gabriela Juárez
Especialista ambiental, Director de Laboratorio

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
D.S.	Julio, 11/16	L.D.	Julio, 11/16	A.G.J.	Julio, 12/16	01



Your P.O. #: 5922
 Your Project #: 178-080
 Your C.O.C. #: na

Attention: Ana Gabriela Juarez

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
 Av. Insurgentes Sur 1763
 Piso 5 Col. Guadalupe INN C.P.
 Del. Alvaro Obregon D.F. Mexico CP., --
 Mexico 01020

Report Date: 2016/07/08
 Report #: R4057011
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6C9936
Received: 2016/06/23, 16:36
 Sample Matrix: Filter
 # Samples Received: 8

Analyses	Quantity Extracted	Date Analyzed	Date	Laboratory Method	Reference
Mercury	8	2016/07/06	2016/07/07	BRL SOP-00104	EPA 7470 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
 * RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key  Clayton Johnson, Project Manager - Air Toxics, Source Evaluation

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
 Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
 Email: CJohnson@maxxam.ca
 Phone# (905)817-5769

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Maxxam Job #: B6C9936
 Report Date: 2016/07/08

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
 Client Project #: 178-080
 Your P.O. #: 5922
 Sampler Initials: MSR

ELEMENTS BY ATOMIC SPECTROSCOPY (FILTER)

Maxxam ID	CPA924	CPA925	CPA926	CPA927	CPA928	CPA929	CPA930		
Sampling Date	2016/05/29	2016/05/12	2016/05/26	2016/05/31	2016/05/31	2016/05/29	2016/05/19		
COC Number	na	na	na	na	na	na	na		
	UNITS	2999-0505	3000-0606	3002-0808	3003-1010	3004-1111	3005-1212	3009-1516	RDL QC Batch
Metals									
Acid Extractable Mercury (Hg)	ug	0.007	0.005	0.012	0.008	0.007	0.008	0.005	0.002 4566523
RDL = Reportable Detection Limit									
QC Batch = Quality Control Batch									

Maxxam ID	CPA931		
Sampling Date	2016/05/24		
COC Number	na		
	UNITS	3010-1717	RDL QC Batch
Metals			
Acid Extractable Mercury (Hg)	ug	0.005	0.002 4566523
RDL = Reportable Detection Limit			
QC Batch = Quality Control Batch			



Maxxam Job #: B6C9936
Report Date: 2016/07/08

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
Client Project #: 178-080
Your P.O. #: 5922
Sampler Initials: MSR

TEST SUMMARY

Maxxam ID: CPA924
Sample ID: 2999-0505
Matrix: Filter

Collected: 2016/05/29
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison

Maxxam ID: CPA925
Sample ID: 3000-0606
Matrix: Filter

Collected: 2016/05/12
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison

Maxxam ID: CPA926
Sample ID: 3002-0808
Matrix: Filter

Collected: 2016/05/26
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison

Maxxam ID: CPA927
Sample ID: 3003-1010
Matrix: Filter

Collected: 2016/05/31
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison

Maxxam ID: CPA928
Sample ID: 3004-1111
Matrix: Filter

Collected: 2016/05/31
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison

Maxxam ID: CPA929
Sample ID: 3005-1212
Matrix: Filter

Collected: 2016/05/29
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison

Maxxam ID: CPA930
Sample ID: 3009-1616
Matrix: Filter

Collected: 2016/05/19
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison



Maxxam Job #: B6C9936
Report Date: 2016/07/08

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
Client Project #: 178-080
Your P.O. #: 5922
Sampler Initials: MSR

TEST SUMMARY

Maxxam ID: CPA931
Sample ID: 3010-1717
Matrix: Filter

Collected: 2016/05/24
Shipped: 2016/06/23
Received: 2016/06/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury	CV/AA	4566523	2016/07/06	2016/07/07	Ron Morrison



Maxxam Job #: B6C9936
 Report Date: 2016/07/08

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
 Client Project #: 178-080
 Your P.O. #: 5922
 Sampler Initials: MSR

GENERAL COMMENTS

Samples have been corrected for desorption efficiencies if average percent recoveries are less than 80% (does not apply to gravimetric and inorganic analysis).

Results relate only to the items tested.



Maxxam Job #: B6C9936
 Report Date: 2016/07/08

QUALITY ASSURANCE REPORT

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
 Client Project #: 178-080
 Your P.O. #: 5922
 Sampler Initials: MSR

QC Batch	Parameter	Date	SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
4566523	Acid Extractable Mercury (Hg)	2016/07/07	103	90 - 110	ND, RDL=0.002	ug	0.29	20
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement. Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy. Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.								



Maxxam Job #: B6C9936
Report Date: 2016/07/08

CTA Consultoría y Tecnología Ambiental México, S.A. de C.V.
Client Project #: 178-080
Your P.O. #: 5922
Sampler Initials: MSR

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ralph Siebert, Operations Manager - Inorganic Analyses

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11.3.3 Informe sobre PST y Gases de Combustión



**MONITOREO DE NO₂, SO₂ Y PARTÍCULAS
SEDIMENTABLES TOTALES
EN LA MINA EL ESCOBAL**

Junio – Julio 2016

San Rafael Las Flores, Santa Rosa, Guatemala

Noviembre de 2016

Este resumen presenta los resultados del monitoreo de calidad del aire realizado para la Mina El Escobal (**la Mina**). El monitoreo fue realizado por Consultoría y Tecnología Ambiental, S.A. (**CTA**) del 14 y 18 de Junio de 2016 para gases de combustión y del 16 de Junio al 18 de Julio para partículas sedimentables totales (PST) en San Rafael Las Flores, Santa Rosa, donde se ubica la Mina. El propósito del monitoreo fue determinar la calidad de aire ambiental en las comunidades aledañas mediante la medición de la concentración de:

- Gases de combustión (**SO₂** y **NO₂**); y
- Partículas Sedimentables Totales (**PST**).

Las estaciones de medición se presentan en el Cuadro 1 y la metodología utilizada en el Cuadro 2.

Cuadro 1: Estaciones de monitoreo de SO₂ y NO₂ y PST

Estación	Ubicación	Coordenadas
EA-1C	Frente a Escuela San Rafael	E (m): 803,887N (m): 1,601,801
EA-2B	Aldea La Cuchilla	E (m): 806,470N (m): 1,601,796
EA-3B	Aldea El Fucío	E (m): 806,538N (m): 1,600,367
EA-4A	Aldea La Puerta de Los Ángeles	E (m): 805,142N (m): 1,599,903
EA-5A	Aldea Sabana Redonda	E (m): 804,352N (m): 1,600,404
EA-6	Norte del proyecto, ruta a Mataquescuintla	E (m): 805,168N (m): 1,603,247
EA-7A	Perímetro del Proyecto colindante con aldea Los Planes	E (m): 805,425N (m): 1,601,523

Coordenadas en metros (m). Datum: NAD27 UTM zona 16N. Fuente: CTA, 2016.

Cuadro 2: Metodologías utilizadas para SO₂ y NO₂ y PST

Gases de Combustión	<p>SO₂: Análisis espectrofotométrico, descrito en el Título 40, Parte 50, Apéndice A de la USEPA.</p> <p>NO₂: Análisis espectrofotométrico. Método de referencia designado por la USEPA: No. EQN-1277-026.</p>
PST	ASTM D 1739-98 (re-aprobación 2004).

Fuente: CTA, 2016.

Los resultados obtenidos para los gases de combustión se compararon con los valores guía reportados en: Calidad de Aire Ambiental: Guías del Banco Mundial (**el Banco**)¹ para SO₂ y NO₂, tomadas de International Finance Corporation (**IFC**) Industry Sector Guidelines for Mining, December 10, 2007 y General Environment Health and Safety Guidelines, December 19/2008.

Los resultados de Partículas Sedimentables Totales (**PST**) se compararon con los valores guía reportados en el Ministerio de Ambiente de la provincia canadiense British Columbia (**BC**)² con respecto a las partículas sedimentables totales para industrias mineras, de fundición y relacionadas (BC air quality objectives for total suspended particulates and dust fall, August 12, 2013).

En el Cuadro 3 se presentan los resultados obtenidos de la medición de gases de combustión realizada en Junio de 2016; y en el Cuadro 4 se presentan los resultados de la medición de PST para el período de 32 días de junio 16 a julio 18 de 2016 (el período promedio de medición es de 30 ± 2 días, por lo que se cumple lo estipulado por la BC).

Cuadro 3: Resultados de la medición de gases de combustión en µg/m³

Estaciones de Muestreo	EA-1C	EA-2B	EA-3B	EA-4A	EA-5A	EA-6	EA-7A	Guías del Banco
SO₂	<13	<13	<13	<13	<13	<13	<13	20 µg/m ³
NO₂	< 9	< 9	< 9	9	< 9	< 9	< 9	*40µg/m ³

SO₂: dióxido de azufre. NO₂: dióxido de nitrógeno. *: Promedio anual.¹: LDM: Límite de detección del método. µg/m³: microgramos sobre metros cúbicos.

Fuente: Laboratorio Ambiental, S. A., 2016.

Cuadro 4: Resultados de la medición de PST g/ (m² x 30 días)

Parámetros	EA-1C	EA-2B	EA-3B	EA-4A	EA-5A	EA-6	EA-7A	Guía de BC
Sólidos Insolubles	7.74	4.88	4.14	14.49	3.22	1.08	2.92	NA
Sólidos Solubles	2.56	1.72	1.31	3.60	1.37	0.84	1.30	

¹Guías del Banco Mundial: www.ifc.org/ifcext/EnvironmentalGuidelines

²Guía de BC: <http://www.bcairquality.ca/reports/pdfs/aqotable.pdf>

Parámetros	EA-1C	EA-2B	EA-3B	EA-4A	EA-5A	EA-6	EA-7A	Guía de BC
Sólidos Totales	10.30	6.60	5.45	18.08	4.59	1.93	4.22	
Partículas sedimentables totales mg/(dm ² *día) ²	3.43	2.20	1.82	6.03	1.53	0.64	1.41	2.90 ¹

g: gramos. m²: metro cuadrado. mg: miligramos. dm²: decímetro cuadrado. ¹: valor referido para un período promedio 30 ± 2 días. ²: Las estaciones fueron muestreadas dentro del período promedio de 30 ± 2 días aprobado por la BC.

Fuente: Laboratorio Ambiental, S. A., 2016.

Gases de Combustión

SO₂:

Como se puede apreciar en el Cuadro 3, las concentraciones se encuentran por debajo del límite de detección del método analítico utilizado en todas las estaciones monitoreadas

NO₂:

- En todas las estaciones de muestreo se obtuvieron resultados menores establecido por el Banco (**40 µg/m³**).

Partículas Sedimentables Totales

- Dos de las siete estaciones, presentan valores de PST que superan el valor guía. La estación que presentó la mayor concentración de PST fue la EA-4A (6.03 mg/(dm² x día), en esta estación hay un alto flujo de tránsito pesado (camiones, pickups y buses) que generan cantidades significativas de polvo. Las estaciones EA-1C, presenta una concentración entre de 3.43 mg/(dm² x día); esto puede atribuirse parcialmente a que esta estación de muestreo se encuentran cerca del campo de foot ball de la escuela, el cual es de tierra y se encuentra en una zona con vientos fuertes.
- Las estaciones que presentaron la menor concentración de PST durante el período de monitoreo, fueron la EA-6 y EA-7A con 0.64 mg/(dm²x día) y 1.41 mg/(dm² x día)

respectivamente. En el caso de la estación EA-7A la baja concentración de PST se puede atribuir a las medidas que toman dentro del Proyecto para reducir el polvo, consistente en el riego de caminos de terracería. La estación EA-6 es una estación de control que se encuentra alejada de la carretera y cuya influencia por tránsito y actividades agrícolas y humanas es mínima.

- Las estaciones EA-2B, EA-3B y EA-5A presentan valores de 2.20 mg/(dm²x día), 1.82 mg/(dm² x día) y 1.53 mg/(dm² x día) respectivamente. Las primeras dos estaciones se encuentran en lugares con caminos de terracería con tránsito vehicular de bajo a medio. La estación EA-5A, se encuentra cerca la carretera hacia Mataquescuintla (pavimentada) y cerca de una fábrica de block.



Anexos

Anexo 1-1: Reportes analíticos

Cliente: Minera San Rafael
Dirección: Boulevard Los Próceres, 18 calle 24-69 z. 10, Centro Empresarial Zona Pradera, Oficina 1406 torre IV
Proyecto: 178-082 (CTA)
Fecha de muestreo: Junio 16 – Julio 18 de 2016
Lugar de muestreo: San Rafael las Flores, Santa Rosa, Guatemala
Fecha de análisis: Julio, 19 al 21 de 2016
Emisión del reporte: Julio, 22 de 2016

Tipo de muestras: Partículas sedimentables en aire durante un período de 30 días.
Análisis: Muestreo y determinación de material particulado total sedimentable en el aire (tasa de sedimentación).
Método analítico: ASTM D1739-98 (Reapproved 2004) Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter)¹. * **Acreditado ISO 17025**

Cuadro 1: Ubicación de estaciones de muestreo

Estación	Ubicación	Fotografía	Factores ambientales
EA-1C	Frente a Escuela San Rafael		Casa dentro del pueblo, caminos pavimentados, vientos fuertes. Campo de foot ball de tierra frente a la casa.

¹ Como complemento del método se agrega sulfato de cobre para evitar el crecimiento de algas durante el periodo de muestreo, según IT-ATM-09 inspecciones reglamentarias de emisiones fugitivas de partículas sedimentables y en suspensión. Consejería de medio ambiente de Andalucía.

Estación	Ubicación	Fotografía	Factores ambientales
EA-2B	Aldea La Cuchilla		Camino de terracería poco tráfico vehicular, transitan especialmente motos. Construcción de casas con adobe en los alrededores.
EA-3B	Aldea El Fucío		Camino de terracería cercano al terreno, tráfico vehicular moderado. Se realizan trabajos de introducción de drenajes y construcción.
	Aldea La Puerta de Los Ángeles		Camino de terracería cercano al terreno, tráfico vehicular alto, los vehículos levantan cantidades considerables de polvo. Evidencia de quema de leña para cocinar.
EA-5A	Aldea Sabana Redonda		El terreno está cerca de la carretera principal (asfaltada), está en campo abierto y cercano a una fábrica de block.

Estación	Ubicación	Fotografía	Factores ambientales
EA-6	Norte del proyecto, ruta a Mataquescuintla		Camino de terracería, poco tráfico vehicular, presencia de ganado vacuno en el terreno.
	Perímetro del Proyecto colindante con aldea Los Planes		Camino de terracería, poco tráfico vehicular, se realizaban trabajos en las piletas de sedimentación, tránsito de tractores y camiones de volteo.

²: Factores ambientales que pueden influir en los resultados. El tiempo de muestreo fue de 30 ± 2 días, de acuerdo a método analítico empleado.

Cuadro 2: Resultados Partículas Sedimentables Totales (PST)

No.	Identificación de la muestra	Tasa de sedimentación			
		Material insoluble en agua [g/(m ² ·30 días)]	Material soluble en agua [g/(m ² ·30 días)]	Total* para un periodo de 30 días [g/(m ² ·30 días)].	Total* para un periodo de 1 día [mg/(dm ² · día)].
	LDM	0.0019	0.017	0.019	0.006
1	EA-1C	7.74	2.56	10.30	3.43
2	EA-2B	4.88	1.72	6.60	2.20
3	EA-3B	4.14	1.31	5.45	1.82
4	EA-4A	14.49	3.60	18.08	6.03
5	EA-5A	3.22	1.37	4.59	1.53
6	EA-6	1.08	0.84	1.93	0.64
7	EA-7A	2.92	1.30	4.22	1.41

LDM: límite de detección del método. **g:** gramos; **mg:** miligramos. **m²:** metros cuadrados. **dm²:** decímetro cuadrado

Anexos:

Anexo 1. Cadena de Custodia R-02-000832

Este Reporte Analítico ha sido elaborado para uso confidencial y exclusivo del cliente; se prohíbe su reproducción, sin la aprobación escrita del Laboratorio. Los resultados aquí expresados representan el mejor juicio del Laboratorio y son válidos únicamente para la porción de muestra presentada a éste. Laboratorio Ambiental, S.A. no asume ninguna responsabilidad ni garantiza la utilización final que se le dé a la información aquí presentada. En caso de requerir alguna modificación en este reporte analítico, solicitarla dentro de los siguientes 30 días a partir de la fecha en que el Laboratorio envió el reporte.



Ing. Diego Silva
Ing. Químico, Gestor de Calidad
Colegiado 1595



MSc. BSc. Ana Gabriela Juárez
Especialista ambiental, Director de Laboratorio

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
L.D.	Julio, 22/16	J.J.	Julio, 22/16	A.G.J.	Julio, 22/16	02

11.3.4 Presión Sonora

ER-1

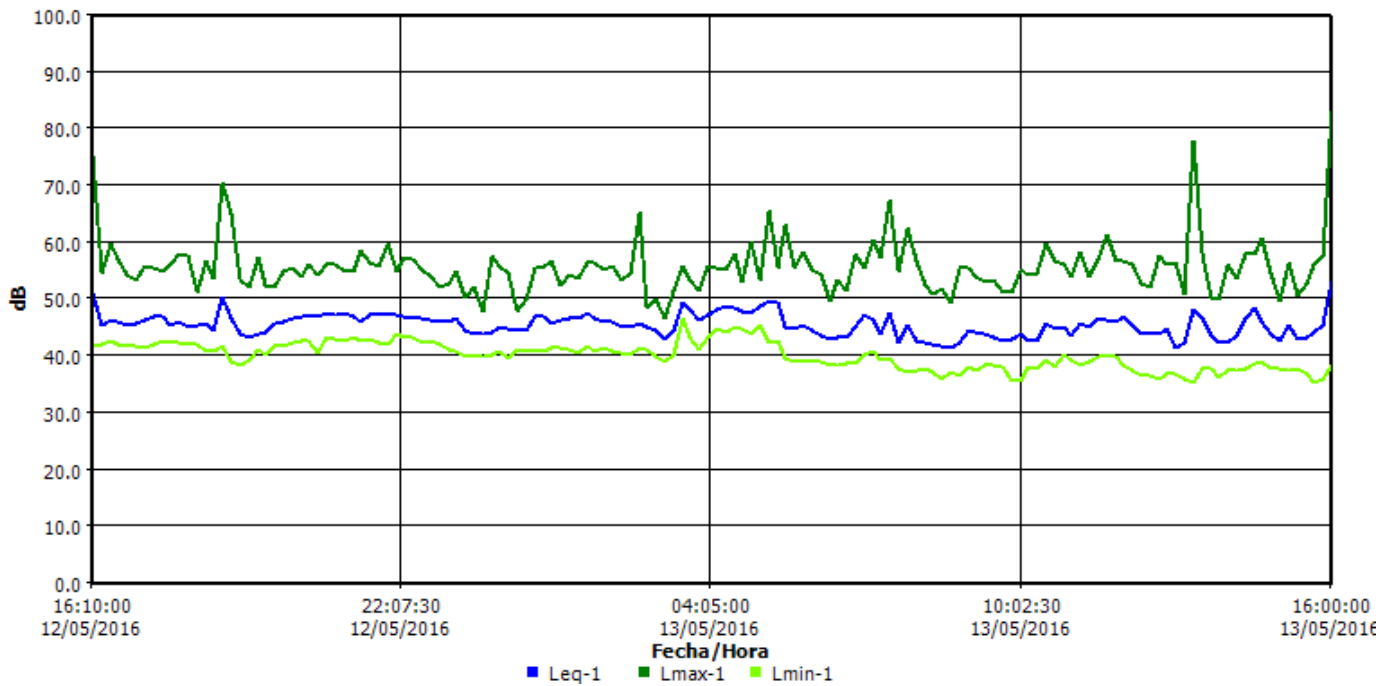
Panel de información

Ubicación Depósito de suelos norte, a inmediaciones de Aldea Los Planes
Nombre ER-1
Sesión padre S021
Hora de inicio Jueves, 12 de Mayo de 2016 16:00:00
Hora de paro Viernes, 13 de Mayo de 2016 16:00:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	35.3 dB	Lmax	1	83.2 dB
Lpk	1	97.6 dB	Leq	1	45.9 dB

Gráfica de datos de registro



ER-1A

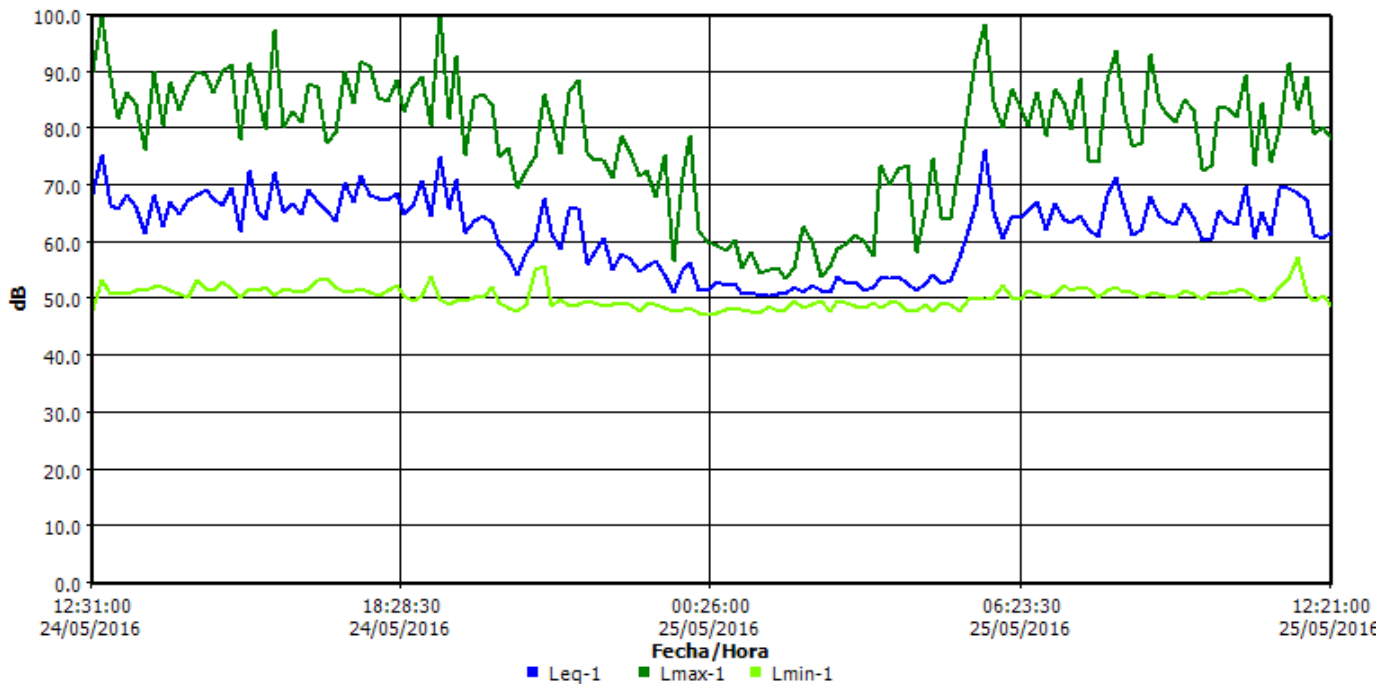
Panel de información

Ubicación San Rafael las Flores
Nombre ER-1A
Sesión padre S230
Hora de inicio Martes, 24 de Mayo de 2016 12:21:00
Hora de paro Miércoles, 25 de Mayo de 2016 12:21:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	C	Respuesta	1	FAST
Lmin	1	47.3 dB	Lmax	1	100.8 dB
Lpk	1	112.7 dB	Leq	1	65.8 dB

Gráfica de datos de registro



ER-2

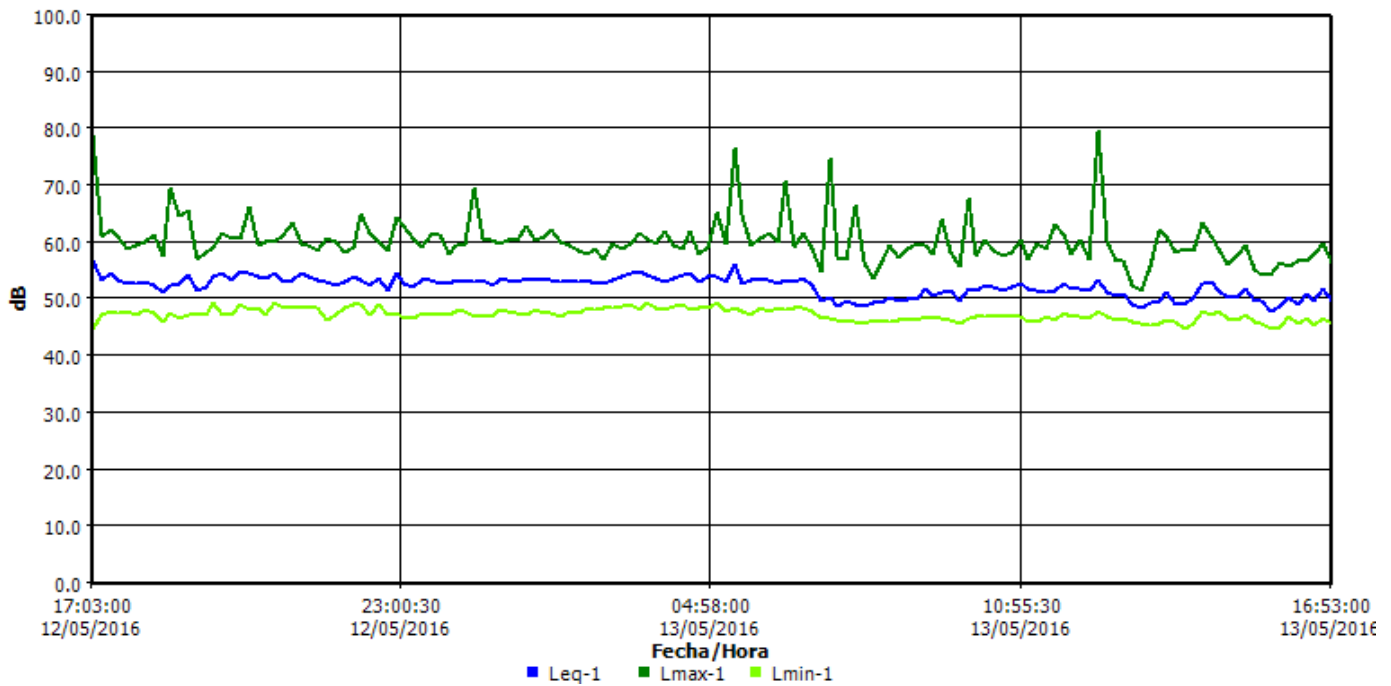
Panel de información

Ubicación Aldea La Cuchilla
Nombre ER-2
Sesión padre S135
Hora de inicio Jueves, 12 de Mayo de 2016 16:53:00
Hora de paro Viernes, 13 de Mayo de 2016 16:53:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	44.8 dB	Lmax	1	79.6 dB
Lpk	1	96.8 dB	Leq	1	52.5 dB

Gráfica de datos de registro



ER-3

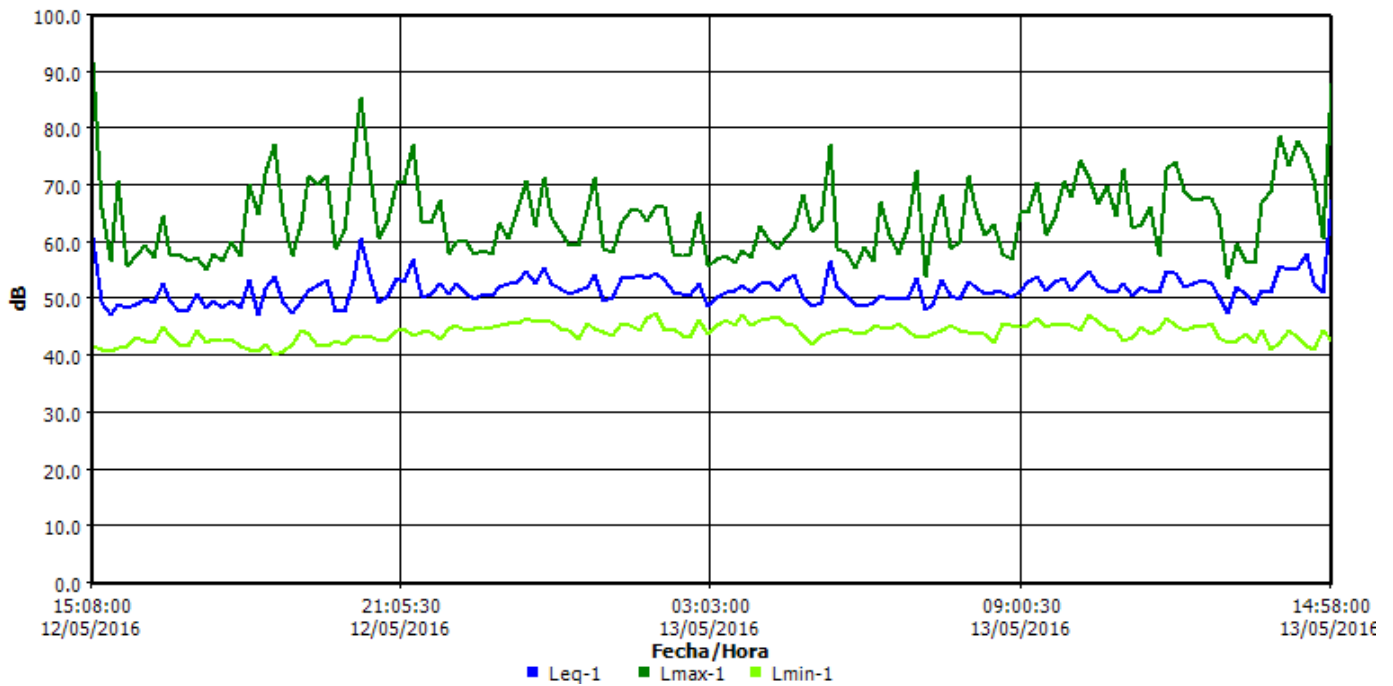
Panel de información

Ubicación Aledaño a Aldea El Fucio
Nombre ER-3
Sesión padre S229
Hora de inicio Jueves, 12 de Mayo de 2016 14:58:00
Hora de paro Viernes, 13 de Mayo de 2016 14:58:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	C	Respuesta	1	FAST
Lmin	1	40.1 dB	Lmax	1	91.9 dB
Lpk	1	110.7 dB	Leq	1	53.3 dB

Gráfica de datos de registro



ER-3A

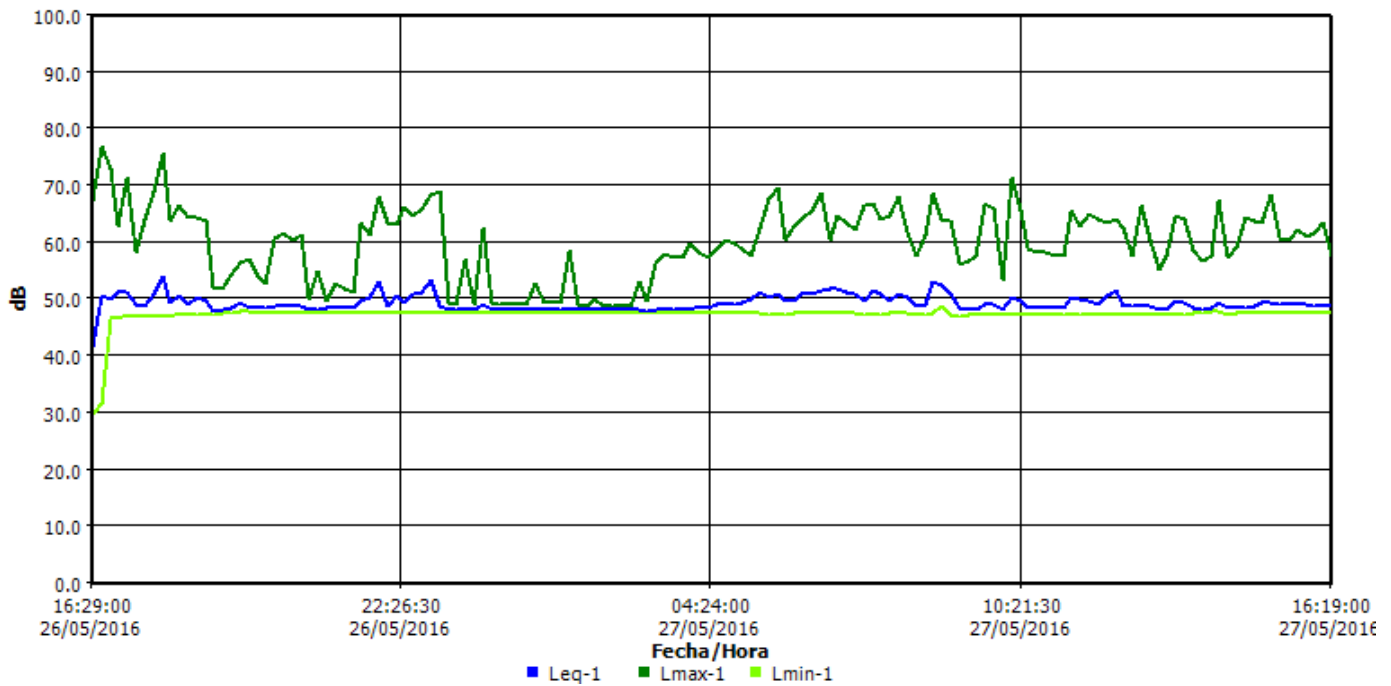
Panel de información

Ubicación Aldea Sabana Redonda
Nombre ER-3A
Sesión padre S141
Hora de inicio Jueves, 26 de Mayo de 2016 16:19:00
Hora de paro Viernes, 27 de Mayo de 2016 16:19:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	29.7 dB	Lmax	1	77 dB
Lpk	1	97.7 dB	Leq	1	49.5 dB

Gráfica de datos de registro



ER-4A

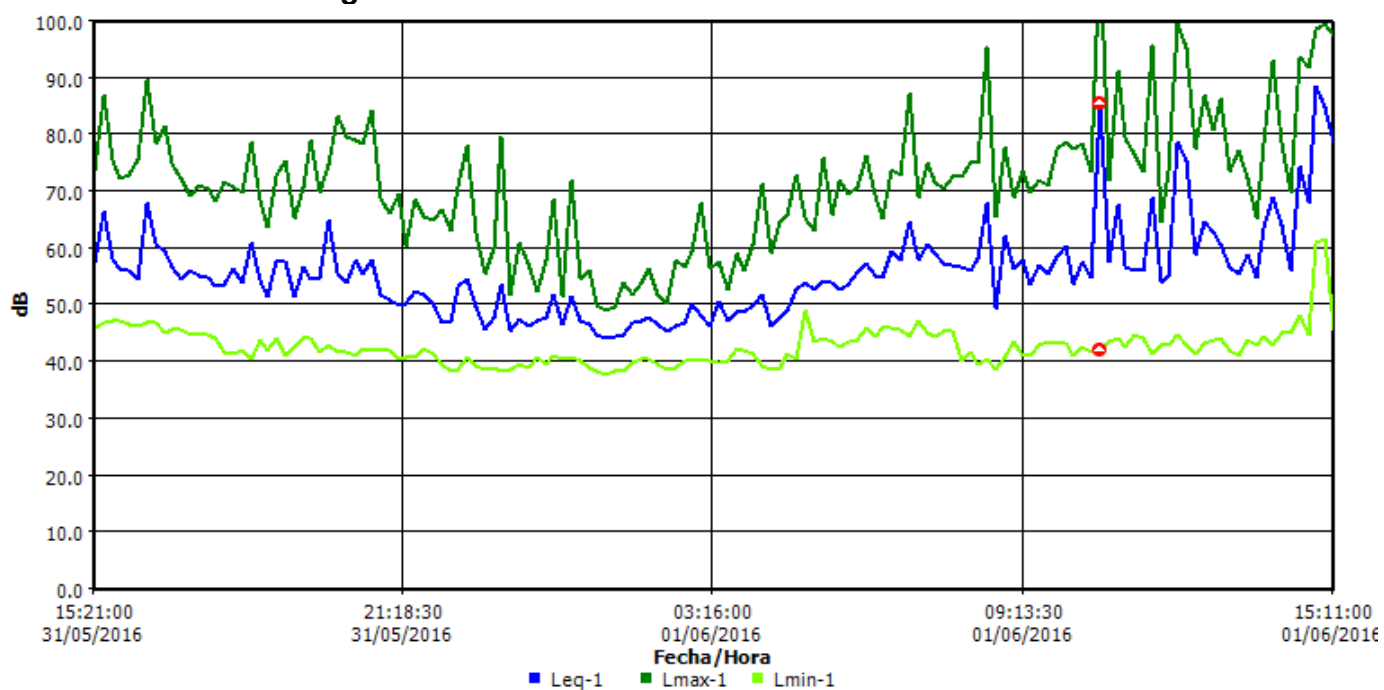
Panel de información

Ubicación Caserío El Portón de los Ángeles.
Nombre ER-4A
Sesión padre S231
Hora de inicio Martes, 31 de Mayo de 2016 15:11:00
Hora de paro Miércoles, 01 de Junio de 2016 15:11:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	C	Respuesta	1	FAST
Lmin	1	37.7 dB	Lmax	1	113.6 dB
Lpk	1	129.5 dB	Leq	1	70.6 dB

Gráfica de datos de registro



ER-5A

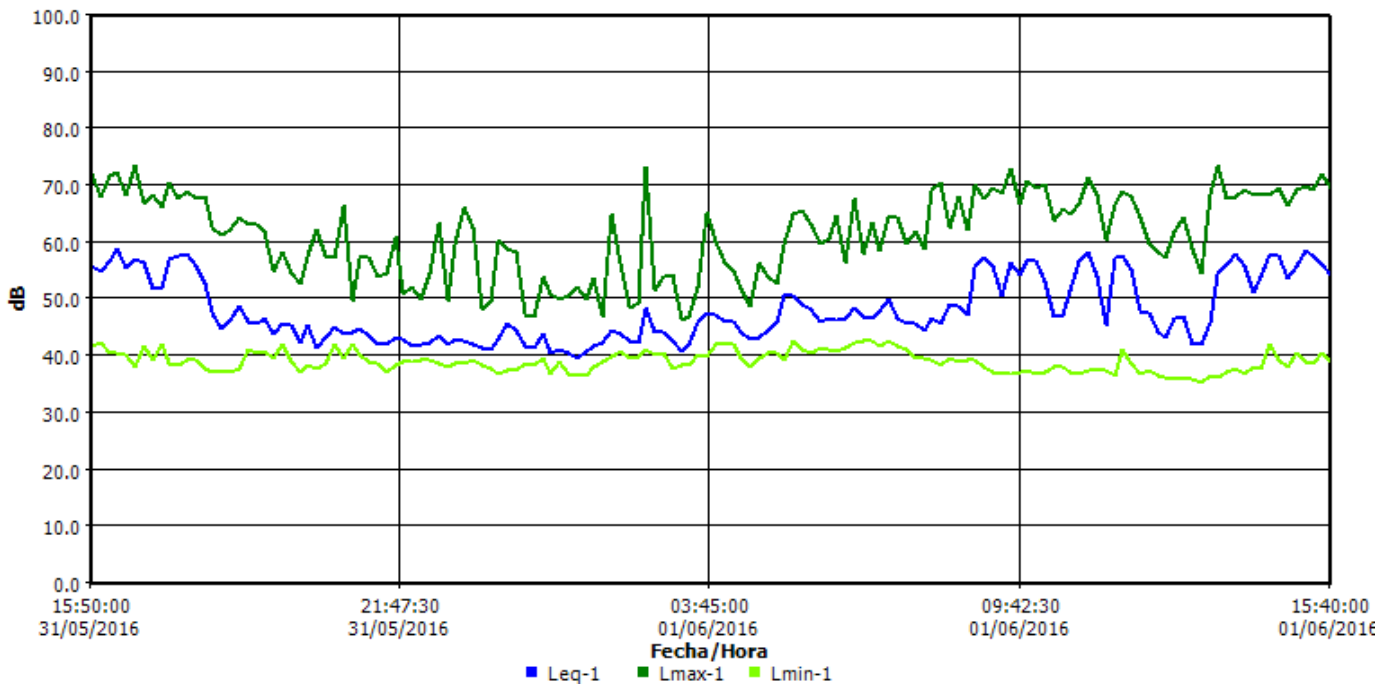
Panel de información

Ubicación Aldea Sabana Redonda
Nombre ER-5A
Sesión padre S142
Hora de inicio Martes, 31 de Mayo de 2016 15:40:00
Hora de paro Miércoles, 01 de Junio de 2016 15:40:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	35.4 dB	Lmax	1	73.5 dB
Lpk	1	96.4 dB	Leq	1	51.7 dB

Gráfica de datos de registro



ER-6

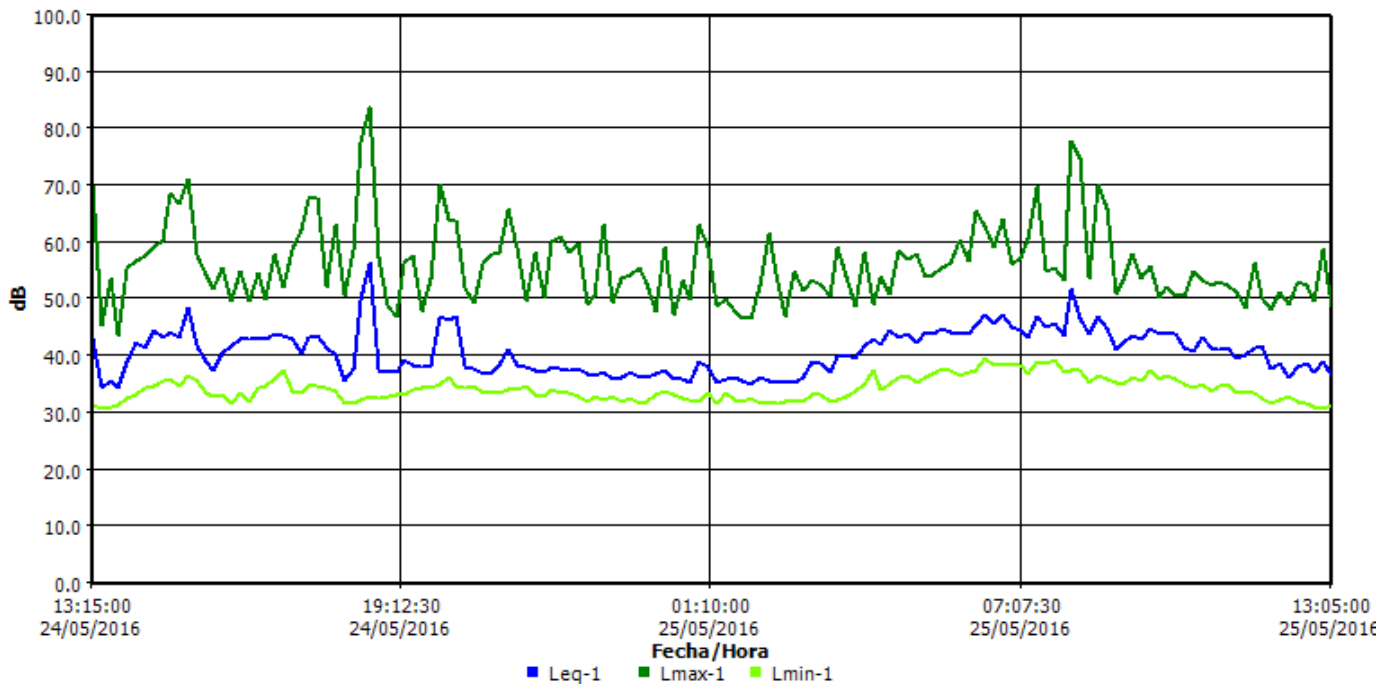
Panel de información

Ubicación Al norte del proyecto, ruta a Mataquescuintla
Nombre ER-6
Sesión padre S022
Hora de inicio Martes, 24 de Mayo de 2016 13:05:00
Hora de paro Miércoles, 25 de Mayo de 2016 13:05:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	30.8 dB	Lmax	1	83.8 dB
Lpk	1	97.7 dB	Leq	1	42.9 dB

Gráfica de datos de registro



ER-7A

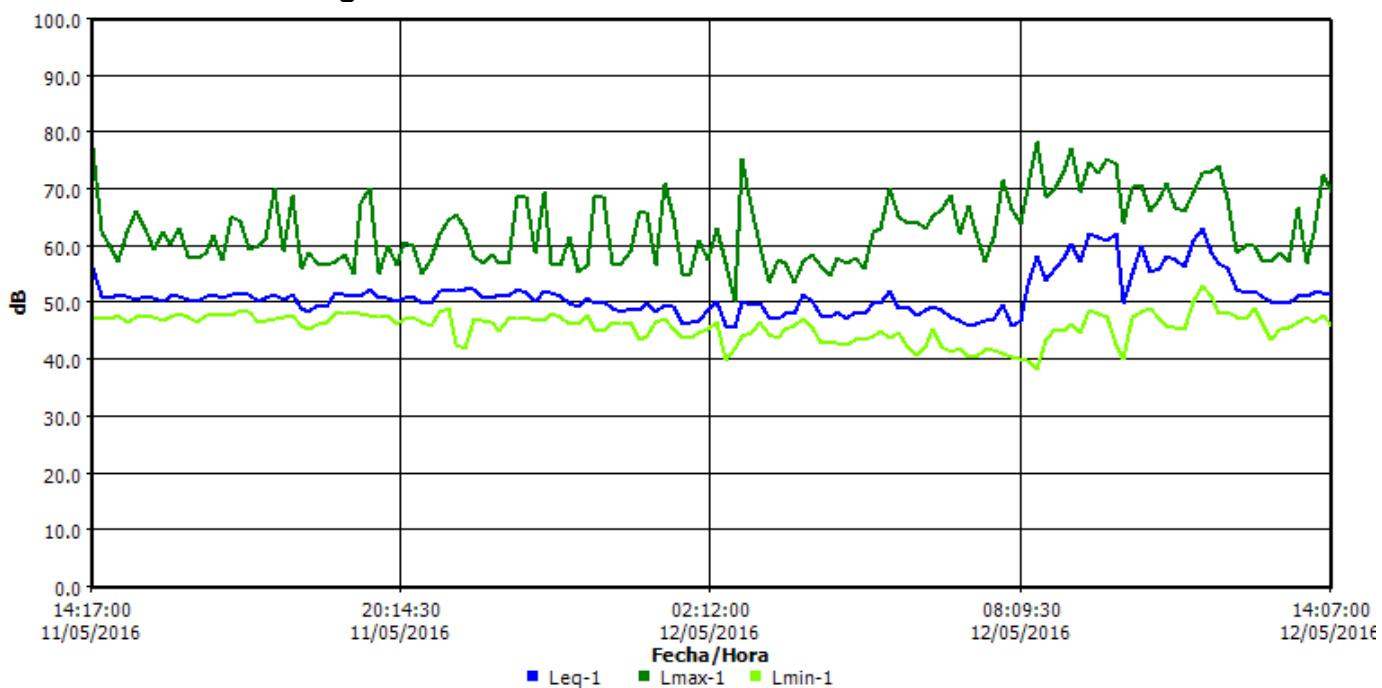
Panel de información

Ubicación Aledaño a Aldea Los Planes
Nombre ER-7A
Sesión padre S134
Hora de inicio Miércoles, 11 de Mayo de 2016 14:07:00
Hora de paro Jueves, 12 de Mayo de 2016 14:07:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	38.5 dB	Lmax	1	78.4 dB
Lpk	1	98.3 dB	Leq	1	53.4 dB

Gráfica de datos de registro



ER-7A

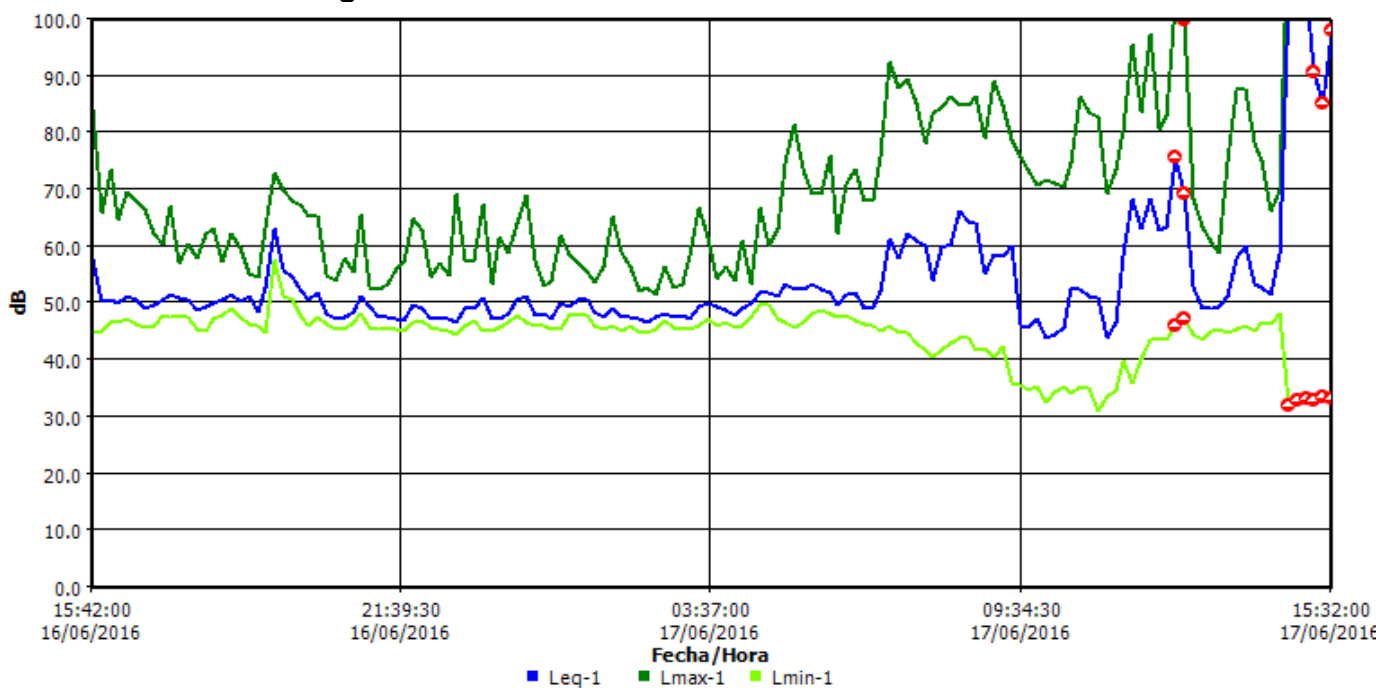
Panel de información

Ubicación Aledaño a Aldea Los Planes
Nombre ER-7A
Sesión padre S147
Hora de inicio Jueves, 16 de Junio de 2016 15:32:00
Hora de paro Viernes, 17 de Junio de 2016 15:32:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	30.9 dB	Lmax	1	119.2 dB
Lpk	1	129.5 dB	Leq	1	88.5 dB

Gráfica de datos de registro



ER-3

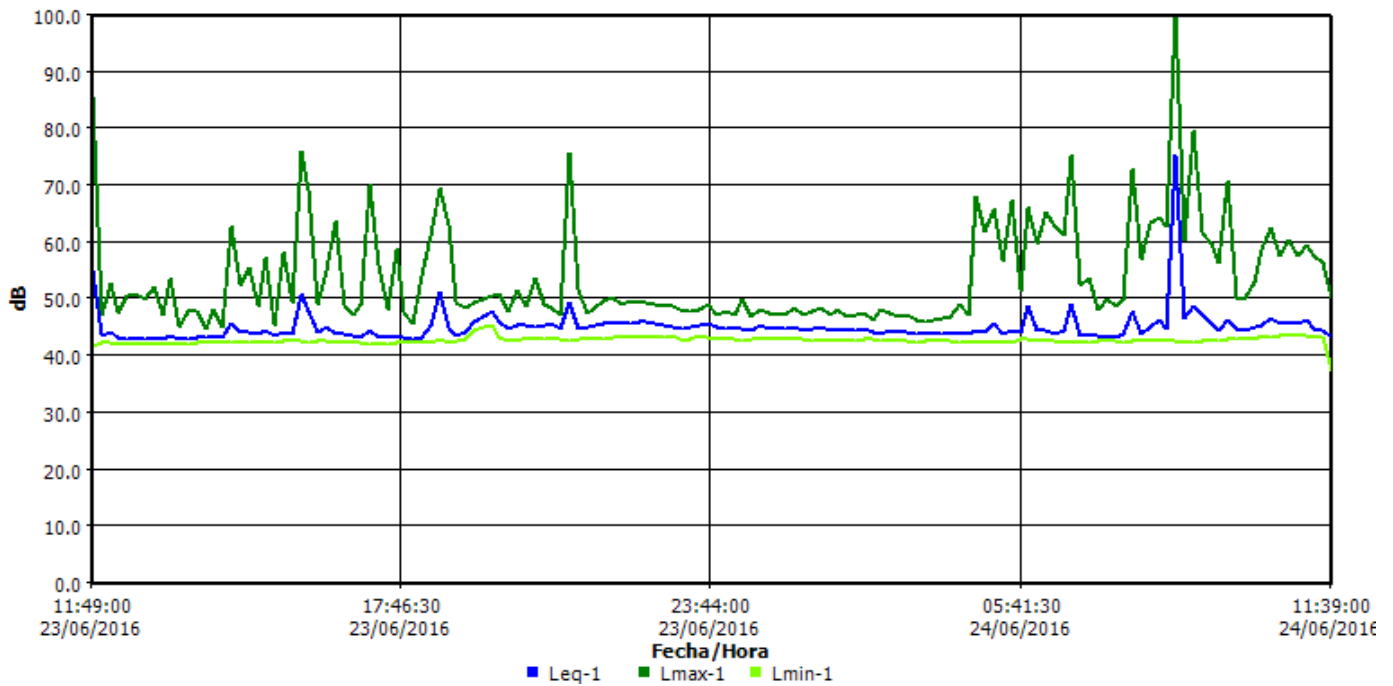
Panel de información

Ubicación Aledaño a Aldea El Fucio
Nombre ER-3
Sesión padre S148
Hora de inicio Jueves, 23 de Junio de 2016 11:39:00
Hora de paro Viernes, 24 de Junio de 2016 11:39:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	37.4 dB	Lmax	1	100.4 dB
Lpk	1	122.4 dB	Leq	1	54.3 dB

Gráfica de datos de registro



ER-2A

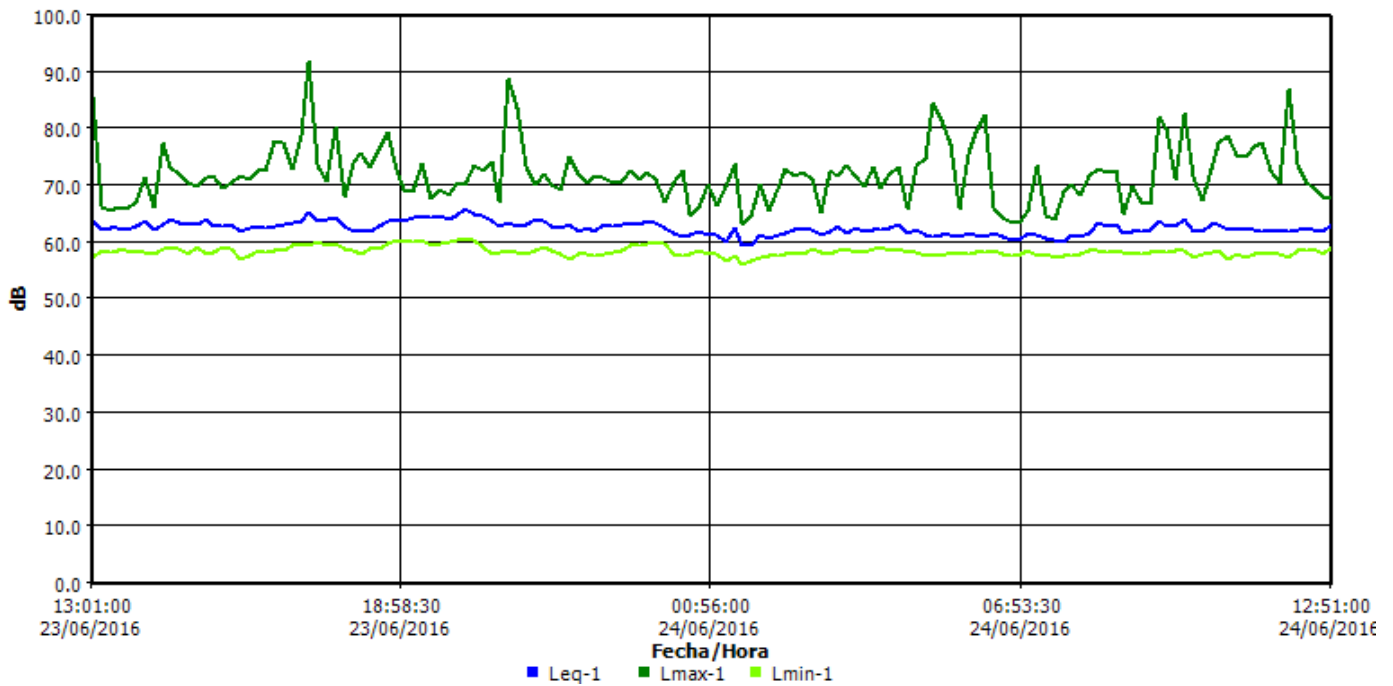
Panel de información

Ubicación Aldea La Cuchilla
Nombre ER-2A
Sesión padre S233
Hora de inicio Jueves, 23 de Junio de 2016 12:51:00
Hora de paro Viernes, 24 de Junio de 2016 12:51:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	C	Respuesta	1	FAST
Lmin	1	56.2 dB	Lmax	1	91.8 dB
Lpk	1	104.9 dB	Leq	1	62.6 dB

Gráfica de datos de registro



ER-1

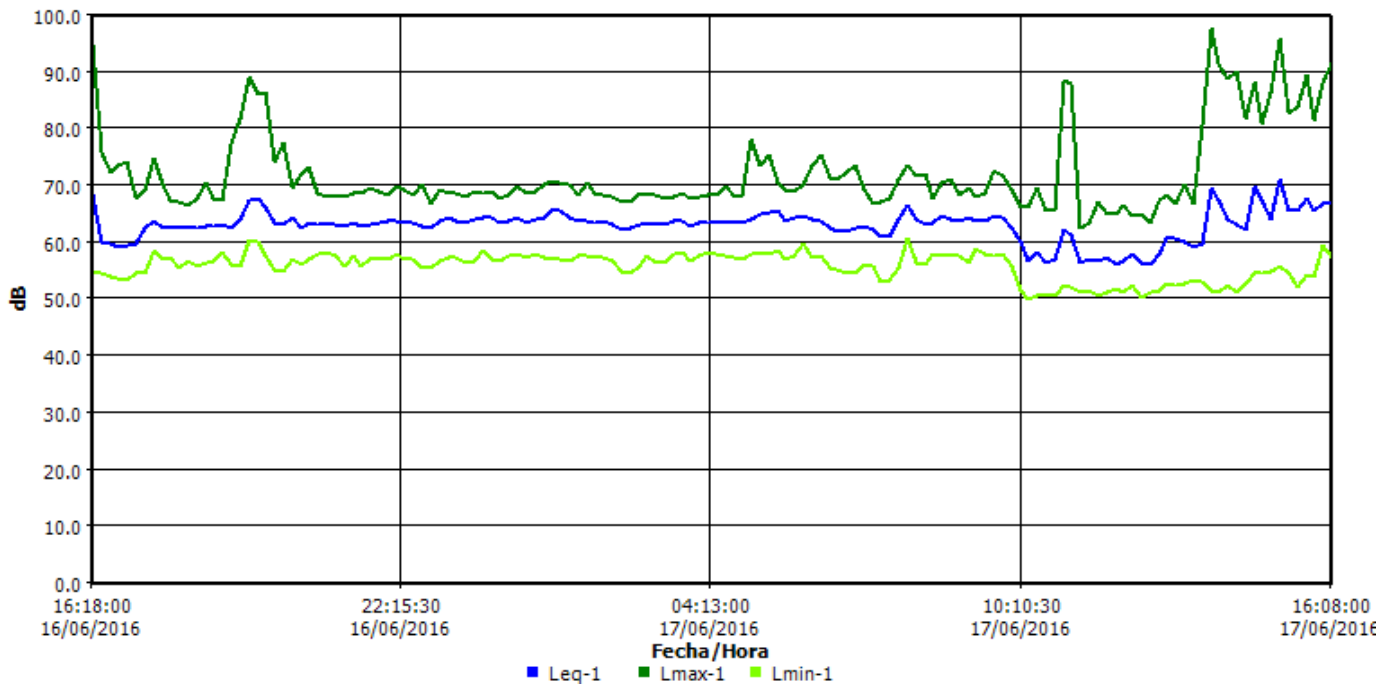
Panel de información

Ubicación Depósito de suelos norte, a inmediaciones de Aldea Los Planes
Nombre ER-1
Sesión padre S232
Hora de inicio Jueves, 16 de Junio de 2016 16:08:00
Hora de paro Viernes, 17 de Junio de 2016 16:08:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	C	Respuesta	1	FAST
Lmin	1	50.1 dB	Lmax	1	97.7 dB
Lpk	1	109.2 dB	Leq	1	63.8 dB

Gráfica de datos de registro



ER-7A

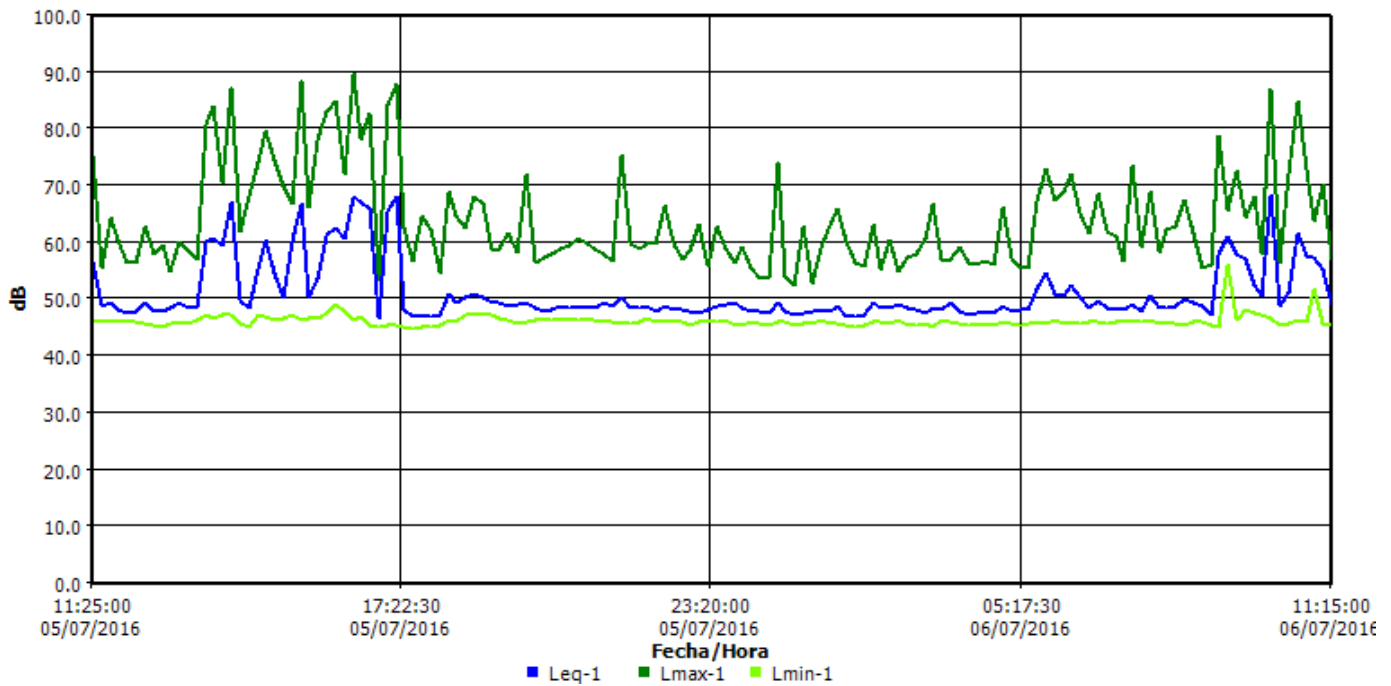
Panel de información

Ubicación Aledaño a Aldea Los Planes
Nombre ER-7A
Sesión padre S028
Hora de inicio Martes, 05 de Julio de 2016 11:15:00
Hora de paro Miércoles, 06 de Julio de 2016 11:15:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	44.9 dB	Lmax	1	89.9 dB
Lpk	1	101.7 dB	Leq	1	56.7 dB

Gráfica de datos de registro



ER-3

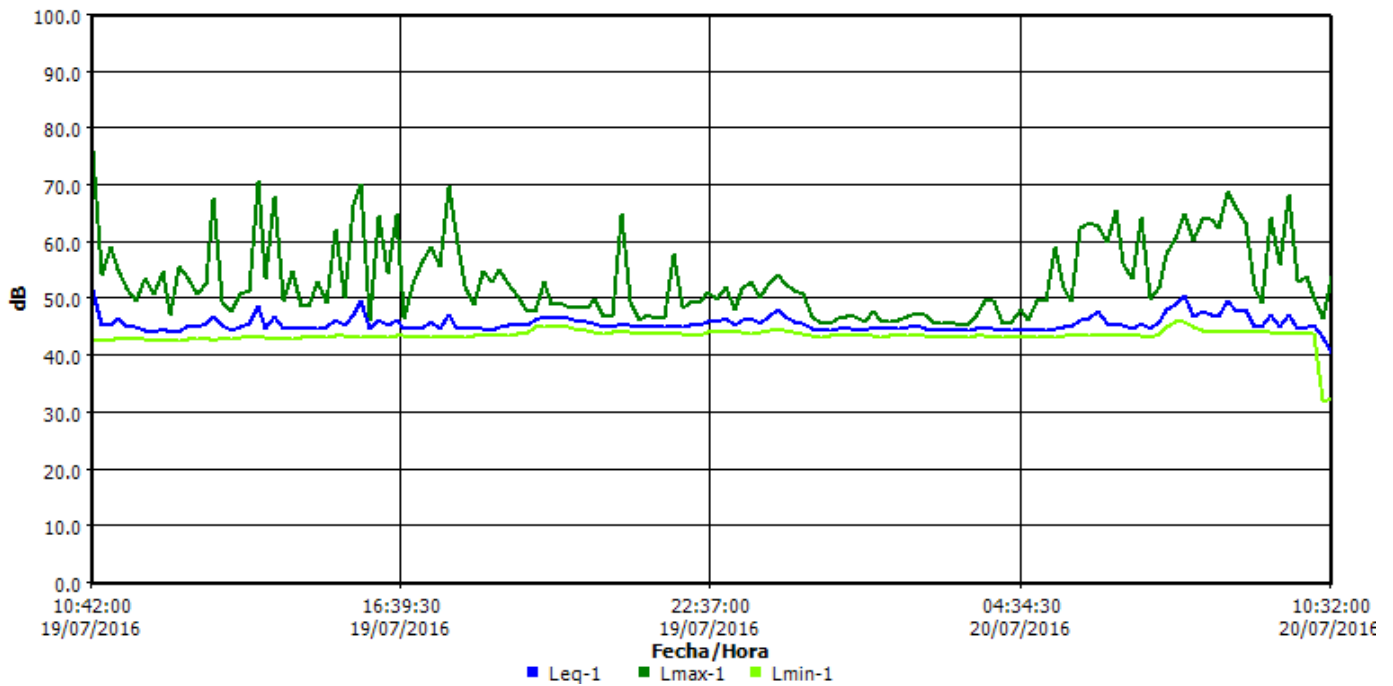
Panel de información

Ubicación Aledaño a Aldea El Fucio
Nombre ER-3
Sesión padre S150
Hora de inicio Martes, 19 de Julio de 2016 10:32:00
Hora de paro Miércoles, 20 de Julio de 2016 10:32:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	100 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	31.9 dB	Lmax	1	75.9 dB
Lpk	1	97.3 dB	Leq	1	45.8 dB

Gráfica de datos de registro



ER-2

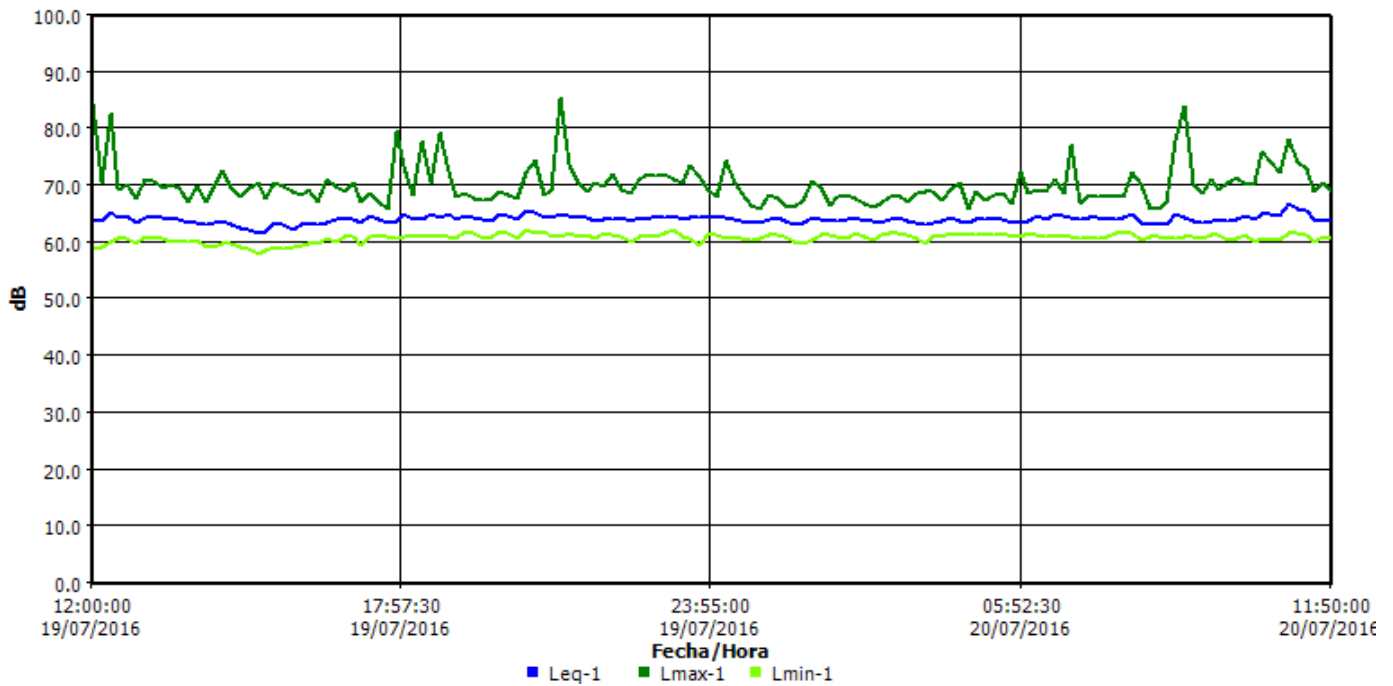
Panel de información

Ubicación Aldea La Cuchilla
Nombre ER-2
Sesión padre S235
Hora de inicio Martes, 19 de Julio de 2016 11:50:00
Hora de paro Miércoles, 20 de Julio de 2016 11:50:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	C	Respuesta	1	FAST
Lmin	1	58.1 dB	Lmax	1	85.6 dB
Lpk	1	106.8 dB	Leq	1	64.1 dB

Gráfica de datos de registro



ER-1

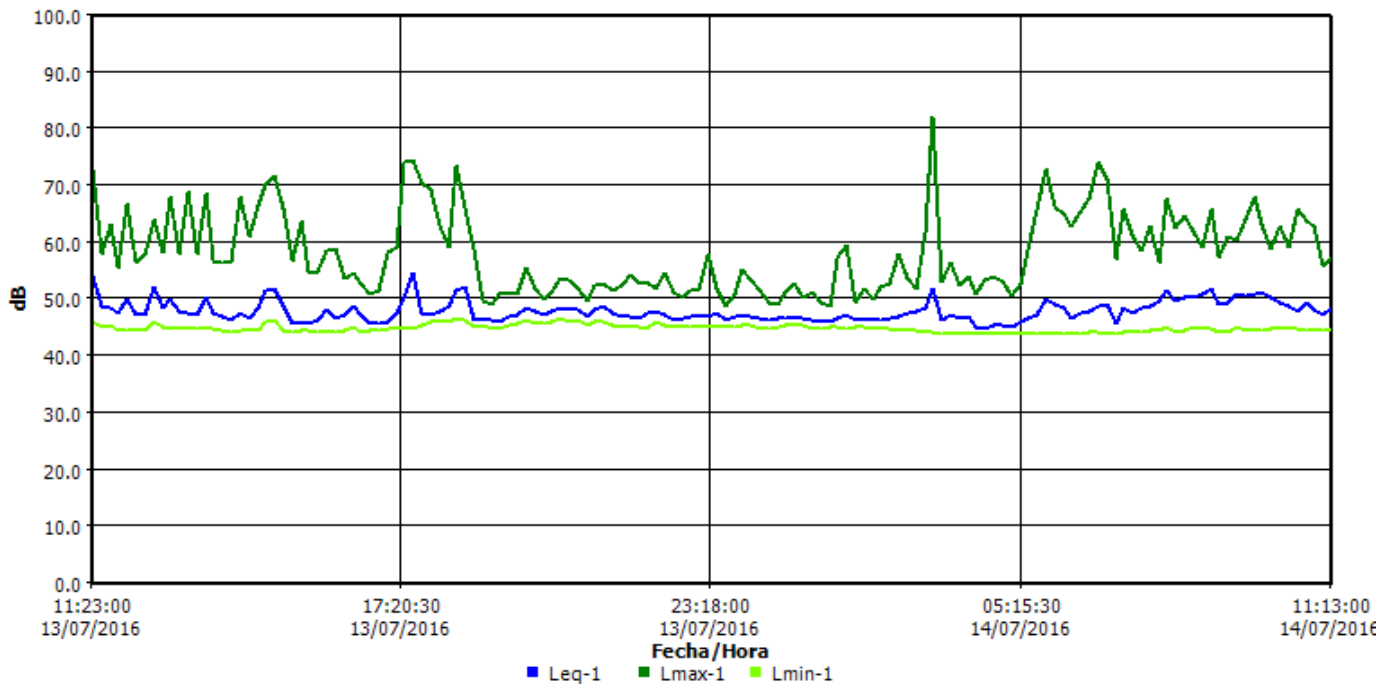
Panel de información

Ubicación Depósito de suelosnorte, a inmediaciones de Aldea Los Planes
Nombre ER-1A
Sesión padre S029
Hora de inicio Miércoles, 13 de Julio de 2016 11:13:00
Hora de paro Jueves, 14 de Julio de 2016 11:13:00
Nombre del usuario

Panel general de datos

<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>	<u>Descripción</u>	<u>Medidor/Sensor</u>	<u>Valor</u>
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	43.8 dB	Lmax	1	82.1 dB
Lpk	1	98 dB	Leq	1	48.3 dB

Gráfica de datos de registro



11.4 Certificados de verificación de los equipos utilizados

11.4.1 Material Particulado (PM₁₀) y Presión Sonora

**CERTIFICADO DE VERIFICACIÓN DE CALIBRACIÓN DE EQUIPOS
PARA MEDICIÓN DE TSP, PM_{2.5} Y PM₁₀**

jun-16

Certificado Numero: 1891

Características del Equipo

Nombre de equipo: Ambient Particulate Sampler
Modelo: PQ200 BGI Instruments
Fabricante: BGI Incorporated
Unidades de medición: Litros Por Minuto (LPM)
Rango de flujo: De 1.00 a 25.00 LPM



Descripción:

Se utiliza el Calibrador BGI "Trical - Nist", el proceso de calibración consiste en hacer pasar por el equipo PQ200 un flujo de aire, el cual es ajustado a un valor específico bajo condiciones estándar de presión y temperatura (1 Atm y 25 °C) para obtener el valor de flujo real.

Nota:

El fabricante establece que el equipo no requiere Re-calibración de fabrica, por lo tanto se utiliza el calendario establecido por CTA para el mantenimiento y calibración.

Información de la Calibración

Equipo No.: 2	Fecha de Verificación de Calibración: 30/06/2016
Número de Serie : 877	Vigencia: 30 Días

Valores Ambientales	
Temperatura (°C)	22.10
Presión (Pulg.Hg)	24.41
Humedad Relativa (%)	65.00

Parámetro	Lectura Calibración PQ200	Lectura Patrón
Flujo (LPM)	16.71	16.7
Temperatura Ambiente (°C)	21.70	24.69*
Temperatura Filtro (°C)	21.70	24.69*
Barómetro (Pulg.Hg)	24.41	24.41*

Test de vacio		
SP (cm H ₂ O) _z	28.00	SP < 33
Pi - Vacio inicial (cm H O)	99.00	ΔP < 5
Pf - Vacio final (cm H O)	97.00	

Estado del Equipo: CALIBRADO

(*)Multimetro ambiental 1227U10 traceable. NIST (National Institute of Standards and Technology).

Patrón Utilizado

Nombre el Equipo: TriCal Nist
No. Serie 000103-3
Rango de Flujo: 0.1-30 LPM
Rango de Temperatura: -40 a 50 °C
Rango de Presión Barométrica: 400-800 mm Hg
No. Método: RFPS-1298-124
Fecha de Calibración del Patrón Utilizado: 10/05/2016

Responsables:

Luis Rey
Responsable

Ing. Hasan Zolata
Supervisor

Falla reportada

Ciente solicita revisión y mantenimiento general.

Observaciones

1 empaque del impactor dañado

Diagnostico

Después de cargar al 100% los equipos, se procedió a correr una prueba de 24 hrs. configurado a 16.7 LPM, encontrando que el equipo funciona correctamente, un empaque del impactor será reemplazado.

Trabajos realizados

Mantenimiento de los siguientes componentes:

- Bomba de vacío (diaragmas, valvulas, ejes)
- Motor eléctrico
- Sensor de flujo másico
- Conexiones del circuito de vacío
- Sistema mecánico de Porta filtro
- Mantenimiento de tarjeta electrónica.
- Ventilador
- Sensor de temperatura externa y interna
- Barómetro atmosférico
- Pantalla Anti-Radiación

Al finalizar el mantenimiento se efectuaron las siguientes verificaciones:

- Prueba de fuga de cada sección del circuito
- Calibración de flujo con patrón trazable ante el NIST
- Calibración de presión barométrica y temperatura con patrón trazable ante el NIST.
- Test final: 1 corridas de más de 24 horas exitosas.

Repuestos utilizados

1 empaque área de impactor

Responsables:



Luis Rey
Responsable



Ing. Hasan Zolata
Supervisor



CONSULTORIA Y TECNOLOGIA AMBIENTAL, S.A.

BGI PQ200 Air Sampling System

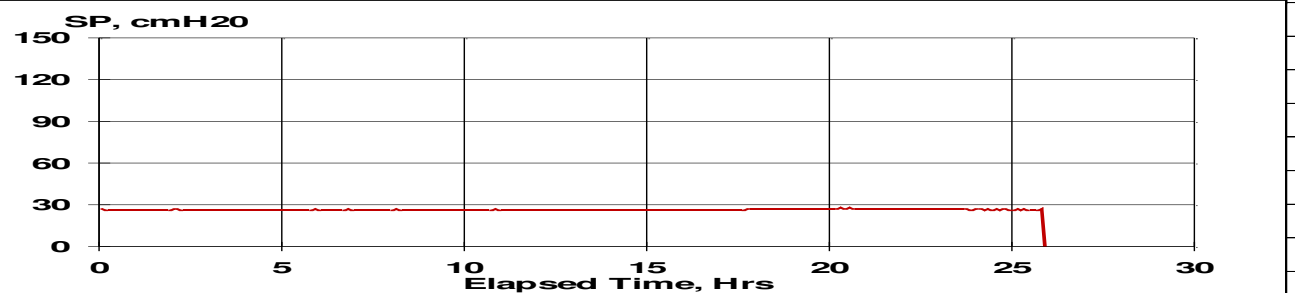
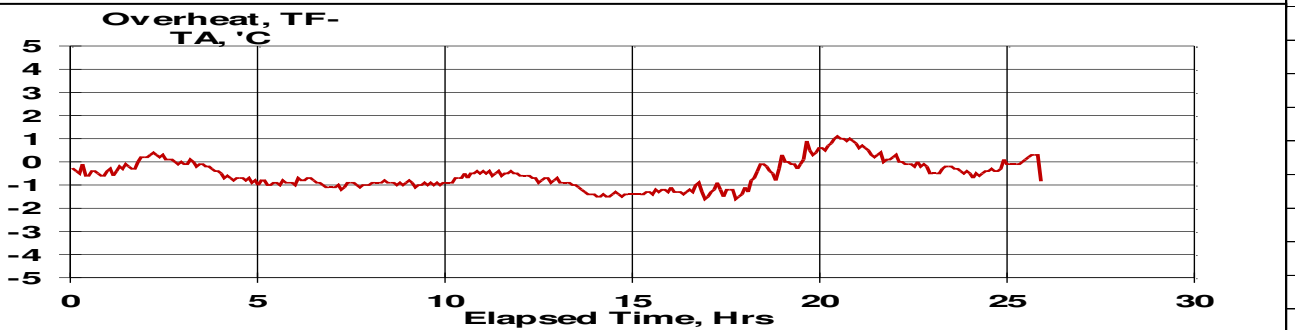
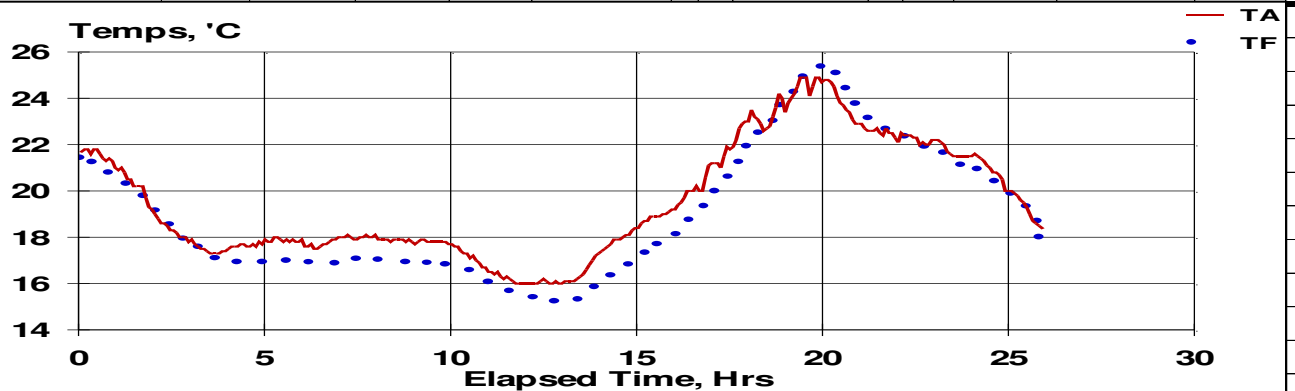
Downloaded 2016 05 jul 15:59:28

Job Details:		Job Code: 1
Job Name: 16JUL05A.JOB	Version: 5.62	Site Name: LABEL
Serial No: 877	Pump Time: 4117:22	Station Code: CTA
Flags: P		Operators: LREY
		User1: _98
		User2:

Max	Min	Avg	Units	Timer Information:		Mass Concentration Data:		
BP	623	618	621	mmHg	Date	Time	Filter ID:	
TA	25.3	15.9	19.6	°C	dd-mmm	hh:mm:ss	Final Wt:	mg
Q	---	---	16.71	Lpm	Start: 16-30-jun	17:00:08	Initial Wt:	mg
QCV			0.62	%	Stop: 16-01-jul	19:00:05	Delta Wt:	0.000 mg
Max overheat			3.3	°C	ET: 25:59:00		Total Vol:	26.044 m ³
occured	03-jul 15:26:07						Mass Conc:	0 µg/m ³

Notes 1: Mant. general

Notes 2:



Hourly Averaged Data							
Date	Start Hour	BP	AmbT	Filt T	Delta T	SP	Flow
yy-dd-mmm	hh:mm:ss	mmHg	°C	°C	°C	cmH2O	aLpm
16-30-jun	17:00:29	620	21.4	21.0	-0.4	26	16.70
16-30-jun	18:05:08	621	19.7	19.7	0.0	26	16.70
16-30-jun	19:05:08	622	18.1	18.2	0.1	26	16.73
16-30-jun	20:05:08	622	17.4	17.1	-0.3	26	16.72
16-30-jun	21:05:08	623	17.7	16.9	-0.8	26	16.73
16-30-jun	22:05:08	623	17.8	16.9	-0.9	26	16.71
16-30-jun	23:05:08	623	17.8	16.8	-0.9	26	16.72
16-01-jul	00:05:08	622	18.0	17.0	-1.0	26	16.69
16-01-jul	01:05:08	622	17.9	17.0	-0.9	26	16.71
16-01-jul	02:05:08	621	17.8	16.8	-1.0	26	16.71
16-01-jul	03:05:08	621	17.0	16.4	-0.6	26	16.71
16-01-jul	04:05:08	621	16.2	15.7	-0.5	26	16.72
16-01-jul	05:05:08	621	16.1	15.3	-0.8	26	16.72
16-01-jul	06:05:08	622	16.6	15.5	-1.2	26	16.72
16-01-jul	07:05:08	622	18.0	16.6	-1.4	26	16.71
16-01-jul	08:05:08	622	18.9	17.6	-1.3	26	16.71
16-01-jul	09:05:08	623	20.1	18.9	-1.3	26	16.72
16-01-jul	10:05:08	623	22.0	20.8	-1.3	26	16.72
16-01-jul	11:05:08	623	23.3	22.8	-0.4	27	16.71
16-01-jul	12:05:08	622	24.5	24.7	0.2	27	16.71
16-01-jul	13:05:08	622	23.9	24.7	0.9	27	16.72
16-01-jul	14:05:08	622	22.6	22.9	0.3	27	16.73
16-01-jul	15:05:08	621	22.2	22.1	-0.1	27	16.71
16-01-jul	16:05:08	621	21.7	21.4	-0.4	27	16.73
16-01-jul	17:05:08	621	21.0	20.6	-0.4	27	16.72
16-01-jul	18:05:08	622	19.4	19.4	0.1	26	16.72

CERTIFICADO DE VERIFICACIÓN DE CALIBRACIÓN DE SONÓMETROS

jun-16

Certificado Numero: 1878

Características del Equipo

Nombre de equipo: Sound Level Meter
Modelo: SoundPro SE/DL
Fabricante: Quest Technologies
Unidades de medición: Decibeles
0.5 dB a 25°C; 1.0 dB arriba del rango de temperatura de -10°C a 50°C.
Precisión: Segundo Detector de picos: 1.5dB desde 40 hasta +10dB relativo al límite superior del rango. Análisis en frecuencia desde 16Hz hasta 16KHz en bandas de octavas y desde 12.5Hz hasta 20KHz en tercios de bandas de octavas
Rango de medición: 4 hz (-3dB) a 50kHz (-3dB) en carga lineal únicamente.



Información de la Calibración

Equipo No.: 3	Fecha de Verificación de Calibración: 22/06/2016	m/d/a
Número de Serie : BGK080007	Vigencia: 30 Días	

Valores Ambientales	
Temperatura °C	21.40
Presion (Pulg. Hg)	24.45
Humedad Relativa (%):	79.60

Lectura de Calibración	114.00	dB
Relectura	114.00	dB

Estado del Equipo: CALIBRADO

Características del Equipo de Calibración

Equipo: QC-10 Calibrator
Numero Serie: QIC100169
Fabricante: Quest Technologies
Rango: 94-114 dB
Fecha Emisión: 26/08/2014
Certificado No.: ICA- 4863114

Responsables

Luis Rey
Responsable

Ing. Hasan Zolata
Supervisor

Falla reportada

Cliente solicita revisión y mantenimiento general.

Observaciones

Equipo no llega a las 24hrs.

Diagnostico

Después de revisar el equipo, se encontró que el equipo no llega a las 24 hrs de corrida, y se determinó que necesita cambio de batería y mantenimiento general.

Trabajos realizados

Mantenimiento de los siguientes componentes:

- Revisión y mantenimiento general de consola de muestreo y kit outdoor.



Al finalizar el mantenimiento se efectuaron las siguientes verificaciones:

- Calibración del equipo.
- Verificación de funciones.
- Test de muestreo de sonido.
- Revisión de kit outdoor.

Repuestos utilizados

- Batería 12V42A de CTA en calidad de préstamo temporal

Responsables:



Luis Rey
Responsable



Ing. Hasan Zolata
Supervisor

Reporte de sesión

04/08/2016

Panel de información

Nombre	S027_BGK080007_28062016_151351
Hora de inicio	27/06/2016 05:05:00 p.m.
Hora de paro	28/06/2016 03:05:01 p.m.
Nombre del dispositivo	BGK080007
Tipo de modelo	SoundPro DL
Revisión del firmware del dispositivo	R.13F
Comentarios	

Panel de datos de resumen

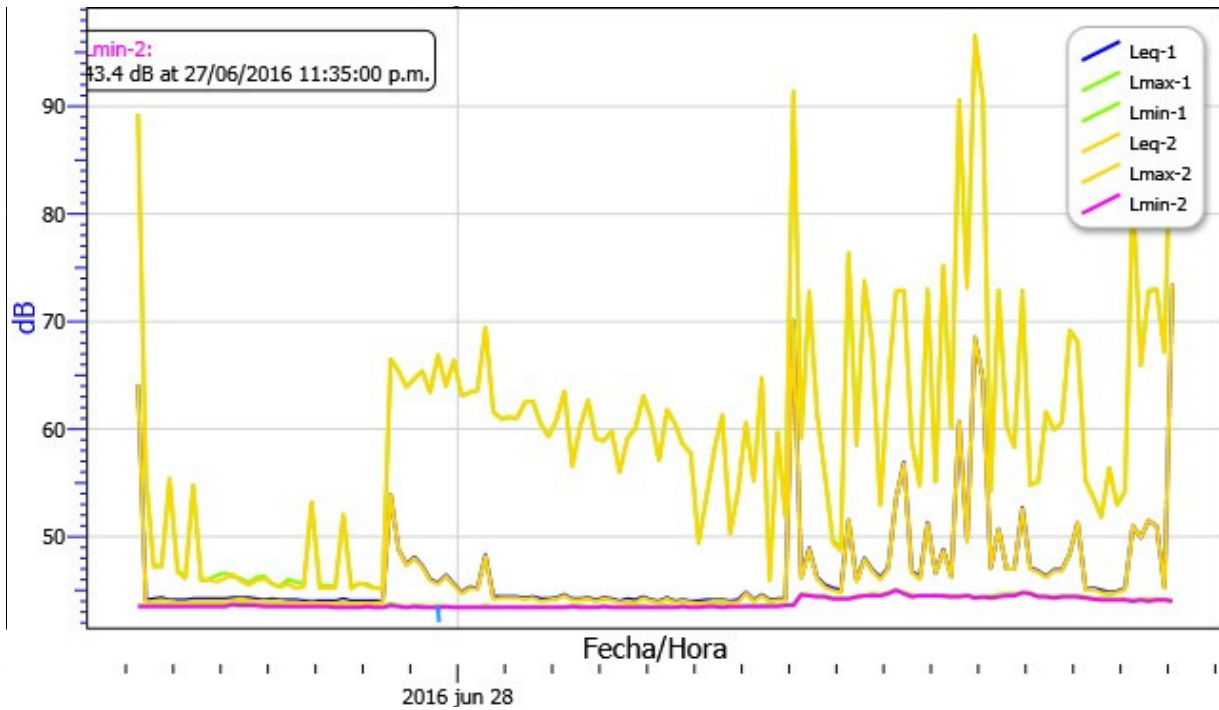
Descripción	Medidor	Valor	Descripción	Medidor	Valor
Lmin	1	43.5 dB	Lmax	1	96.6 dB
Leq	1	56 dB			
Nivel de criterio	1	85 dB	Índice de intercambio	1	3 dB
Respuesta	1	FAST	Ponderación	1	A
Habilitar umbral int.	1	False	Umbral de integración	1	80 dB
Leq	2	55.9 dB	Lmax	2	96.5 dB
Lmin	2	43.4 dB			
Ponderación	2	A	Nivel de criterio	2	90 dB
Respuesta	2	FAST	Índice de intercambio	2	3 dB
Habilitar umbral int.	2	False	Umbral de integración	2	81 dB

Historial de calibración

Fecha	Acción de calibración	Nivel	Tipo de modelo del calibrador	Número de serie	Fecha de certificación
22/06/2016 03:58:07 p.m.	Calibración	114.0	QC-10	QIC100169	26/08/2016

Gráfica de datos de registro

S027_BGK080007_28062016_151351: Gráfica de datos de registro



11.5 Informe Original de los Resultados Analíticos obtenidos de muestras de agua del Laboratorio ACZ Laboratories, INC. Correspondiente al Monitoreo de Junio 2016

11.5.1 Muestras de Agua Superficial (SW)

March 30, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29453

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 16, 2016. This project has been assigned to ACZ's project number, L29453. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29453. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

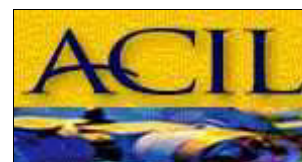
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 29, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

March 30, 2016

Project ID: Escobal

ACZ Project ID: L29453

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 5 miscellaneous samples from Tahoe Resources, Inc. on March 16, 2016. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L29453. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for parameters flagged with "H" flags (H3, HE), received either after the hold time expired or too close to the hold time.

Sample Analysis

These samples were analyzed for inorganic, organic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. For samples with a TDS ratio over 1.2 and a TDS value greater than 150 mg/L, the samples were not retested based on historical re-analysis data and the sample matrix.

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW1-E

ACZ Sample ID: **L29453-01**
 Date Sampled: 03/14/16 09:55
 Date Received: 03/16/16
 Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/22/16 8:33	enb
Cyanide, WAD	SM4500-CN I- distillation								03/23/16 6:57	enb
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/20/16 11:50	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 16:08	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/20/16 11:37	spl
Total Hot Plate Digestion	M200.2 ICP								03/19/16 12:40	aeb
Total Hot Plate Digestion	M200.2 ICP-MS				*				03/21/16 11:36	scp

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW1-E

ACZ Sample ID: **L29453-01**

Date Sampled: 03/14/16 09:55

Date Received: 03/16/16

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/19/16 14:48	gss
Aluminum, total	M200.7 ICP	1	0.03	B		mg/L	0.03	0.2	03/21/16 18:36	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/22/16 23:25	msh
Antimony, total	M200.8 ICP-MS	2		U		mg/L	0.0008	0.004	03/22/16 19:54	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0024			mg/L	0.0002	0.001	03/22/16 23:25	msh
Arsenic, total	M200.8 ICP-MS	2	0.0027			mg/L	0.0004	0.002	03/22/16 19:54	msh
Barium, dissolved	M200.7 ICP	1	0.171			mg/L	0.003	0.02	03/19/16 14:48	gss
Barium, total	M200.7 ICP	1	0.169			mg/L	0.003	0.02	03/21/16 18:36	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:48	gss
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/21/16 18:36	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/19/16 14:48	gss
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/22/16 14:42	gss
Boron, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/19/16 14:48	gss
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/21/16 18:36	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 23:25	msh
Cadmium, total	M200.8 ICP-MS	2		U		mg/L	0.0002	0.001	03/22/16 19:54	msh
Calcium, dissolved	M200.7 ICP	1	52.1		*	mg/L	0.1	0.5	03/19/16 14:48	gss
Calcium, total	M200.7 ICP	1	49.2			mg/L	0.1	0.5	03/21/16 18:36	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:48	gss
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/21/16 18:36	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:48	gss
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/21/16 18:36	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:48	gss
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/21/16 18:36	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/19/16 14:48	gss
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/21/16 18:36	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/19/16 14:48	gss
Iron, total	M200.7 ICP	1		U		mg/L	0.02	0.05	03/21/16 18:36	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/23/16 23:24	mfm
Lead, total	M200.8 ICP-MS	2		U		mg/L	0.0002	0.001	03/23/16 19:04	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 14:48	gss
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/21/16 18:36	aeb
Magnesium, dissolved	M200.7 ICP	1	5.4			mg/L	0.2	1	03/19/16 14:48	gss
Magnesium, total	M200.7 ICP	1	5.4			mg/L	0.2	1	03/21/16 18:36	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/19/16 14:48	gss
Manganese, total	M200.7 ICP	1		U		mg/L	0.005	0.03	03/21/16 18:36	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 16:39	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/29/16 15:13	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/19/16 14:48	gss
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/21/16 18:36	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 14:48	gss
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/21/16 18:36	aeb
Potassium, dissolved	M200.7 ICP	1	5.1			mg/L	0.2	1	03/19/16 14:48	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW1-E

ACZ Sample ID: **L29453-01**
Date Sampled: 03/14/16 09:55
Date Received: 03/16/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	5.1		mg/L	0.2	1	03/21/16 18:36	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/19/16 14:48	gss
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/21/16 18:36	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/22/16 23:25	msh
Selenium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.0005	03/22/16 19:54	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/22/16 23:25	msh
Silver, total	M200.8 ICP-MS	2		U	mg/L	0.0001	0.0005	03/22/16 19:54	msh
Sodium, dissolved	M200.7 ICP	1	10.4	*	mg/L	0.2	1	03/19/16 14:48	gss
Sodium, total	M200.7 ICP	1	10.3		mg/L	0.2	1	03/21/16 18:36	aeb
Strontium, dissolved	M200.7 ICP	1	0.219	*	mg/L	0.005	0.03	03/19/16 14:48	gss
Strontium, total	M200.7 ICP	1	0.214		mg/L	0.005	0.03	03/21/16 18:36	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/22/16 23:25	msh
Thallium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.001	03/22/16 19:54	msh
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/19/16 14:48	gss
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/21/16 18:36	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/19/16 14:48	gss
Titanium, total	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	03/21/16 18:36	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	03/22/16 23:25	msh
Uranium, total	M200.8 ICP-MS	2		U *	mg/L	0.0002	0.001	03/22/16 19:54	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/19/16 14:48	gss
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/21/16 18:36	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/19/16 14:48	gss
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/21/16 18:36	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW1-E

ACZ Sample ID: **L29453-01**
Date Sampled: 03/14/16 09:55
Date Received: 03/16/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	123		*	mg/L	2	20	03/22/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Total Alkalinity		1	123		*	mg/L	2	20	03/22/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			03/30/16 0:00	calc
Sum of Anions			3.6			meq/L			03/30/16 0:00	calc
Sum of Cations			3.6			meq/L			03/30/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 11:53	abd
Chloride	SM4500Cl-E	1	5.2		*	mg/L	0.5	2	03/25/16 8:46	krh
Conductivity @25C	SM2510B	1	345		*	umhos/cm	1	10	03/22/16 14:50	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/22/16 10:59	mss2
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 21:14	pjb
Fluoride	SM4500F-C	1	0.14	B	*	mg/L	0.05	0.3	03/18/16 16:14	abd
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		152			mg/L	0.2	5	03/30/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.08	B	*	mg/L	0.02	0.1	03/25/16 21:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/23/16 10:13	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.1	B	*	mg/L	0.1	0.5	03/21/16 11:51	mss2
pH (lab)	SM4500H+ B									
pH		1	8.2	H	*	units	0.1	0.1	03/22/16 0:00	abd
pH measured at		1	20.9		*	C	0.1	0.1	03/22/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus		0.19	B		mg/L	0.06	0.2	03/30/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	03/18/16 23:34	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.06	H	*	mg/L	0.02	0.05	03/16/16 21:21	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/23/16 1:20	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	270		*	mg/L	10	20	03/18/16 12:22	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/16/16 16:41	emk
Residue, Total (TS) @ 105C	SM2540B	1	266		*	mg/L	10	20	03/16/16 16:21	emk
Sulfate	D516-02/-07 - Turbidimetric	5	45.2		*	mg/L	5	25	03/24/16 11:47	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/16/16 16:38	sck
TDS (calculated)	Calculation		199			mg/L			03/30/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.36						03/30/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW2-E

ACZ Sample ID: **L29453-02**
Date Sampled: 03/14/16 08:55
Date Received: 03/16/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/22/16 8:40	enb
Cyanide, WAD	SM4500-CN I- distillation								03/23/16 7:14	enb
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/20/16 12:06	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 16:13	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/20/16 11:44	spl
Total Hot Plate Digestion	M200.2 ICP-MS								03/21/16 12:12	scp
Total Hot Plate Digestion	M200.2 ICP								03/19/16 13:15	aeb

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW2-EACZ Sample ID: **L29453-02**

Date Sampled: 03/14/16 08:55

Date Received: 03/16/16

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.06	B		mg/L	0.03	0.2	03/19/16 14:51	gss
Aluminum, total	M200.7 ICP	1	0.10	B		mg/L	0.03	0.2	03/22/16 14:51	gss
Antimony, dissolved	M200.8 ICP-MS	1	0.0140			mg/L	0.0004	0.002	03/22/16 23:34	msh
Antimony, total	M200.8 ICP-MS	1	0.0141			mg/L	0.0004	0.002	03/22/16 20:09	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0109			mg/L	0.0002	0.001	03/22/16 23:34	msh
Arsenic, total	M200.8 ICP-MS	1	0.0118			mg/L	0.0002	0.001	03/22/16 20:09	msh
Barium, dissolved	M200.7 ICP	1	0.049			mg/L	0.003	0.02	03/19/16 14:51	gss
Barium, total	M200.7 ICP	1	0.051			mg/L	0.003	0.02	03/22/16 14:51	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:51	gss
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:51	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/19/16 14:51	gss
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/22/16 14:51	gss
Boron, dissolved	M200.7 ICP	1	0.17			mg/L	0.01	0.05	03/19/16 14:51	gss
Boron, total	M200.7 ICP	1	0.18			mg/L	0.01	0.05	03/22/16 14:51	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 23:34	msh
Cadmium, total	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	03/22/16 20:09	msh
Calcium, dissolved	M200.7 ICP	1	415		*	mg/L	0.1	0.5	03/19/16 14:51	gss
Calcium, total	M200.7 ICP	1	419			mg/L	0.1	0.5	03/22/16 14:51	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:51	gss
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:51	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:51	gss
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:51	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 14:51	gss
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:51	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/19/16 14:51	gss
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/22/16 14:51	gss
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/19/16 14:51	gss
Iron, total	M200.7 ICP	1	0.02	B		mg/L	0.02	0.05	03/22/16 14:51	gss
Lead, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	03/23/16 23:27	mfm
Lead, total	M200.8 ICP-MS	1	0.0029			mg/L	0.0001	0.0005	03/23/16 19:16	mfm
Lithium, dissolved	M200.7 ICP	1	0.096			mg/L	0.008	0.04	03/19/16 14:51	gss
Lithium, total	M200.7 ICP	1	0.105			mg/L	0.008	0.04	03/22/16 14:51	gss
Magnesium, dissolved	M200.7 ICP	1	23.4			mg/L	0.2	1	03/19/16 14:51	gss
Magnesium, total	M200.7 ICP	1	24.7			mg/L	0.2	1	03/22/16 14:51	gss
Manganese, dissolved	M200.7 ICP	1	0.021	B		mg/L	0.005	0.03	03/19/16 14:51	gss
Manganese, total	M200.7 ICP	1	0.037			mg/L	0.005	0.03	03/22/16 14:51	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 16:41	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/29/16 15:15	pta
Molybdenum, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.02	0.1	03/19/16 14:51	gss
Molybdenum, total	M200.7 ICP	1	0.05	B		mg/L	0.02	0.1	03/22/16 14:51	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 14:51	gss
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/22/16 14:51	gss
Potassium, dissolved	M200.7 ICP	1	11			mg/L	0.2	1	03/19/16 14:51	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW2-E

ACZ Sample ID: **L29453-02**
Date Sampled: 03/14/16 08:55
Date Received: 03/16/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	11.9		mg/L	0.2	1	03/22/16 14:51	gss
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/19/16 14:51	gss
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/22/16 14:51	gss
Selenium, dissolved	M200.8 ICP-MS	1	0.0009		mg/L	0.0001	0.0003	03/22/16 23:34	msh
Selenium, total	M200.8 ICP-MS	1	0.0010		mg/L	0.0001	0.0003	03/22/16 20:09	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/22/16 23:34	msh
Silver, total	M200.8 ICP-MS	1	0.00016	B	mg/L	0.00005	0.0003	03/22/16 20:09	msh
Sodium, dissolved	M200.7 ICP	1	86.3	*	mg/L	0.2	1	03/19/16 14:51	gss
Sodium, total	M200.7 ICP	1	93.7		mg/L	0.2	1	03/22/16 14:51	gss
Strontium, dissolved	M200.7 ICP	1	4.120	*	mg/L	0.005	0.03	03/19/16 14:51	gss
Strontium, total	M200.7 ICP	1	4.390		mg/L	0.005	0.03	03/22/16 14:51	gss
Thallium, dissolved	M200.8 ICP-MS	1	0.0003	B	mg/L	0.0001	0.0005	03/22/16 23:34	msh
Thallium, total	M200.8 ICP-MS	1	0.0003	B	mg/L	0.0001	0.0005	03/22/16 20:09	msh
Tin, dissolved	M200.7 ICP	1	0.04	B	mg/L	0.04	0.2	03/19/16 14:51	gss
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 13:02	gss
Titanium, dissolved	M200.7 ICP	1	0.015	B	mg/L	0.005	0.03	03/19/16 14:51	gss
Titanium, total	M200.7 ICP	1	0.014	B	mg/L	0.005	0.03	03/22/16 14:51	gss
Uranium, dissolved	M200.8 ICP-MS	1	0.0004	B	mg/L	0.0001	0.0005	03/22/16 23:34	msh
Uranium, total	M200.8 ICP-MS	1	0.0004	B	mg/L	0.0001	0.0005	03/23/16 19:16	mfm
Vanadium, dissolved	M200.7 ICP	1	0.011	B	mg/L	0.005	0.03	03/19/16 14:51	gss
Vanadium, total	M200.7 ICP	1	0.011	B	mg/L	0.005	0.03	03/22/16 14:51	gss
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/19/16 14:51	gss
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/22/16 14:51	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW2-E

ACZ Sample ID: **L29453-02**
Date Sampled: 03/14/16 08:55
Date Received: 03/16/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	35.0		*	mg/L	2	20	03/22/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Total Alkalinity		1	35.0		*	mg/L	2	20	03/22/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-1.8			%			03/30/16 0:00	calc
Sum of Anions			28			meq/L			03/30/16 0:00	calc
Sum of Cations			27			meq/L			03/30/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 11:58	abd
Chloride	SM4500Cl-E	1	92.2		*	mg/L	0.5	2	03/25/16 8:46	krh
Conductivity @25C	SM2510B	1	2120		*	umhos/cm	1	10	03/22/16 14:59	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/22/16 11:00	mss2
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 21:15	pjb
Fluoride	SM4500F-C	1	1.54		*	mg/L	0.05	0.3	03/18/16 16:18	abd
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1130			mg/L	0.2	5	03/30/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.88		*	mg/L	0.02	0.1	03/25/16 21:51	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.07	B	*	mg/L	0.05	0.2	03/23/16 10:16	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.6		*	mg/L	0.1	0.5	03/21/16 11:53	mss2
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	03/22/16 0:00	abd
pH measured at		1	20.7		*	C	0.1	0.1	03/22/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/30/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/18/16 23:36	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/16/16 21:23	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/23/16 1:21	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	1920		*	mg/L	10	20	03/18/16 12:24	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/16/16 16:44	emk
Residue, Total (TS) @ 105C	SM2540B	1	1960		*	mg/L	10	20	03/16/16 16:27	emk
Sulfate	D516-02/-07 - Turbidimetric	50	1180		*	mg/L	50	250	03/24/16 13:02	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/16/16 16:41	sck
TDS (calculated)	Calculation		1840			mg/L			03/30/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.04						03/30/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4-E

ACZ Sample ID: **L29453-03**
Date Sampled: 03/14/16 08:15
Date Received: 03/16/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/22/16 8:55	enb
Cyanide, WAD	SM4500-CN I- distillation		-						03/23/16 7:31	enb
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/20/16 12:23	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 16:19	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/20/16 11:51	spl
Total Hot Plate Digestion	M200.2 ICP-MS				*				03/21/16 12:24	scp
Total Hot Plate Digestion	M200.2 ICP								03/19/16 13:26	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4-E

ACZ Sample ID: **L29453-03**

Date Sampled: 03/14/16 08:15

Date Received: 03/16/16

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.04	B		mg/L	0.03	0.2	03/19/16 15:00	gss
Aluminum, total	M200.7 ICP	1	0.18	B		mg/L	0.03	0.2	03/22/16 14:54	gss
Antimony, dissolved	M200.8 ICP-MS	1	0.0027			mg/L	0.0004	0.002	03/22/16 23:44	msh
Antimony, total	M200.8 ICP-MS	2	0.0030	B		mg/L	0.0008	0.004	03/22/16 20:12	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0054			mg/L	0.0002	0.001	03/22/16 23:44	msh
Arsenic, total	M200.8 ICP-MS	2	0.0060			mg/L	0.0004	0.002	03/22/16 20:12	msh
Barium, dissolved	M200.7 ICP	1	0.116			mg/L	0.003	0.02	03/19/16 15:00	gss
Barium, total	M200.7 ICP	1	0.118			mg/L	0.003	0.02	03/22/16 14:54	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:00	gss
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:54	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/19/16 15:00	gss
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/22/16 14:54	gss
Boron, dissolved	M200.7 ICP	1	0.07			mg/L	0.01	0.05	03/19/16 15:00	gss
Boron, total	M200.7 ICP	1	0.06			mg/L	0.01	0.05	03/22/16 14:54	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 23:44	msh
Cadmium, total	M200.8 ICP-MS	2		U		mg/L	0.0002	0.001	03/22/16 20:12	msh
Calcium, dissolved	M200.7 ICP	1	180		*	mg/L	0.1	0.5	03/19/16 15:00	gss
Calcium, total	M200.7 ICP	1	178			mg/L	0.1	0.5	03/22/16 14:54	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:00	gss
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:54	gss
Cobalt, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/19/16 15:00	gss
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:54	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:00	gss
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:54	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/19/16 15:00	gss
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/22/16 14:54	gss
Iron, dissolved	M200.7 ICP	1	0.13			mg/L	0.02	0.05	03/19/16 15:00	gss
Iron, total	M200.7 ICP	1	0.41			mg/L	0.02	0.05	03/22/16 14:54	gss
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	03/23/16 23:36	mfm
Lead, total	M200.8 ICP-MS	2	0.0006	B		mg/L	0.0002	0.001	03/23/16 19:19	mfm
Lithium, dissolved	M200.7 ICP	1	0.026	B		mg/L	0.008	0.04	03/19/16 15:00	gss
Lithium, total	M200.7 ICP	1	0.029	B		mg/L	0.008	0.04	03/22/16 14:54	gss
Magnesium, dissolved	M200.7 ICP	1	13.5			mg/L	0.2	1	03/19/16 15:00	gss
Magnesium, total	M200.7 ICP	1	13.6			mg/L	0.2	1	03/22/16 14:54	gss
Manganese, dissolved	M200.7 ICP	1	0.238			mg/L	0.005	0.03	03/19/16 15:00	gss
Manganese, total	M200.7 ICP	1	0.270			mg/L	0.005	0.03	03/22/16 14:54	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 16:43	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/29/16 15:17	pta
Molybdenum, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.02	0.1	03/19/16 15:00	gss
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/22/16 14:54	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 15:00	gss
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/22/16 14:54	gss
Potassium, dissolved	M200.7 ICP	1	13.1			mg/L	0.2	1	03/19/16 15:00	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4-E

ACZ Sample ID: **L29453-03**
Date Sampled: 03/14/16 08:15
Date Received: 03/16/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	11.2		mg/L	0.2	1	03/22/16 14:54	gss
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/19/16 15:00	gss
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/22/16 14:54	gss
Selenium, dissolved	M200.8 ICP-MS	1	0.0003		mg/L	0.0001	0.0003	03/22/16 23:44	msh
Selenium, total	M200.8 ICP-MS	2	0.0004	B	mg/L	0.0002	0.0005	03/22/16 20:12	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/22/16 23:44	msh
Silver, total	M200.8 ICP-MS	2		U	mg/L	0.0001	0.0005	03/22/16 20:12	msh
Sodium, dissolved	M200.7 ICP	1	41.8	*	mg/L	0.2	1	03/19/16 15:00	gss
Sodium, total	M200.7 ICP	1	42.2		mg/L	0.2	1	03/22/16 14:54	gss
Strontium, dissolved	M200.7 ICP	1	1.480	*	mg/L	0.005	0.03	03/19/16 15:00	gss
Strontium, total	M200.7 ICP	1	1.530		mg/L	0.005	0.03	03/22/16 14:54	gss
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/22/16 23:44	msh
Thallium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.001	03/22/16 20:12	msh
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/19/16 15:00	gss
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 13:05	gss
Titanium, dissolved	M200.7 ICP	1	0.016	B	mg/L	0.005	0.03	03/19/16 15:00	gss
Titanium, total	M200.7 ICP	1	0.018	B	mg/L	0.005	0.03	03/22/16 14:54	gss
Uranium, dissolved	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	03/22/16 23:44	msh
Uranium, total	M200.8 ICP-MS	2	0.0002	B	mg/L	0.0002	0.001	03/23/16 19:19	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/19/16 15:00	gss
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/22/16 14:54	gss
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/19/16 15:00	gss
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/22/16 14:54	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4-E

ACZ Sample ID: **L29453-03**
Date Sampled: 03/14/16 08:15
Date Received: 03/16/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	85.8		*	mg/L	2	20	03/22/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Total Alkalinity		1	85.8		*	mg/L	2	20	03/22/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			4.3			%			03/30/16 0:00	calc
Sum of Anions			11			meq/L			03/30/16 0:00	calc
Sum of Cations			12			meq/L			03/30/16 0:00	calc
Chemical Oxygen Demand	M410.4	1	14	B	*	mg/L	10	20	03/21/16 12:12	abd
Chloride	SM4500Cl-E	1	39.8		*	mg/L	0.5	2	03/25/16 8:47	krh
Conductivity @25C	SM2510B	1	1110		*	umhos/cm	1	10	03/22/16 15:08	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/22/16 11:02	mss2
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 21:17	pjb
Fluoride	SM4500F-C	1	0.44		*	mg/L	0.05	0.3	03/18/16 16:21	abd
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		505			mg/L	0.2	5	03/30/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	4.93		*	mg/L	0.06	0.3	03/25/16 22:07	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.15	B	*	mg/L	0.05	0.2	03/23/16 10:21	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.8		*	mg/L	0.1	0.5	03/21/16 11:55	mss2
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	03/22/16 0:00	abd
pH measured at		1	21.3		*	C	0.1	0.1	03/22/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus		0.68			mg/L	0.06	0.2	03/30/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.22		*	mg/L	0.02	0.05	03/18/16 23:37	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.18	H	*	mg/L	0.02	0.05	03/16/16 21:26	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.25		*	mg/L	0.02	0.05	03/23/16 1:24	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	922		*	mg/L	10	20	03/18/16 12:27	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	7.0	B	*	mg/L	5	20	03/16/16 16:47	emk
Residue, Total (TS) @ 105C	SM2540B	1	930		*	mg/L	10	20	03/16/16 16:32	emk
Sulfate	D516-02/-07 - Turbidimetric	20	406		*	mg/L	20	100	03/24/16 11:57	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/16/16 16:43	sck
TDS (calculated)	Calculation		749			mg/L			03/30/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.23						03/30/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SW5-E

ACZ Sample ID: **L29453-04**

Date Sampled: 03/14/16 08:15

Date Received: 03/16/16

Sample Matrix: *Surface Water*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/22/16 9:09	enb
Cyanide, WAD	SM4500-CN I- distillation								03/23/16 7:40	enb
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/20/16 12:31	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 16:24	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/20/16 11:57	spl
Total Hot Plate Digestion	M200.2 ICP-MS								03/21/16 12:36	scp
Total Hot Plate Digestion	M200.2 ICP								03/19/16 13:38	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW5-E

ACZ Sample ID: **L29453-04**
Date Sampled: 03/14/16 08:15
Date Received: 03/16/16
Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/19/16 15:03	gss
Aluminum, total	M200.7 ICP	1	0.08	B		mg/L	0.03	0.2	03/22/16 14:57	gss
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/22/16 23:47	msh
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/22/16 20:15	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0013			mg/L	0.0002	0.001	03/22/16 23:47	msh
Arsenic, total	M200.8 ICP-MS	1	0.0015			mg/L	0.0002	0.001	03/22/16 20:15	msh
Barium, dissolved	M200.7 ICP	1	0.054			mg/L	0.003	0.02	03/19/16 15:03	gss
Barium, total	M200.7 ICP	1	0.056			mg/L	0.003	0.02	03/22/16 14:57	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:03	gss
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:57	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/19/16 15:03	gss
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/22/16 14:57	gss
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:03	gss
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:57	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 23:47	msh
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 20:15	msh
Calcium, dissolved	M200.7 ICP	1	9.1		*	mg/L	0.1	0.5	03/19/16 15:03	gss
Calcium, total	M200.7 ICP	1	8.7			mg/L	0.1	0.5	03/22/16 14:57	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:03	gss
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:57	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:03	gss
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:57	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:03	gss
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 14:57	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/19/16 15:03	gss
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/22/16 14:57	gss
Iron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.02	0.05	03/19/16 15:03	gss
Iron, total	M200.7 ICP	1	0.12			mg/L	0.02	0.05	03/22/16 14:57	gss
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/23/16 23:45	mfm
Lead, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/23/16 19:21	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 15:03	gss
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/22/16 14:57	gss
Magnesium, dissolved	M200.7 ICP	1	1.7			mg/L	0.2	1	03/19/16 15:03	gss
Magnesium, total	M200.7 ICP	1	1.8			mg/L	0.2	1	03/22/16 14:57	gss
Manganese, dissolved	M200.7 ICP	1	0.014	B		mg/L	0.005	0.03	03/19/16 15:03	gss
Manganese, total	M200.7 ICP	1	0.017	B		mg/L	0.005	0.03	03/22/16 14:57	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 16:45	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 11:00	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/19/16 15:03	gss
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/22/16 14:57	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 15:03	gss
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/22/16 14:57	gss
Potassium, dissolved	M200.7 ICP	1	2.9			mg/L	0.2	1	03/19/16 15:03	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW5-E

ACZ Sample ID: **L29453-04**
 Date Sampled: 03/14/16 08:15
 Date Received: 03/16/16
 Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	3		mg/L	0.2	1	03/22/16 14:57	gss
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/19/16 15:03	gss
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/22/16 14:57	gss
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/22/16 23:47	msh
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/22/16 20:15	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/22/16 23:47	msh
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/22/16 20:15	msh
Sodium, dissolved	M200.7 ICP	1	5.9	*	mg/L	0.2	1	03/19/16 15:03	gss
Sodium, total	M200.7 ICP	1	6.1		mg/L	0.2	1	03/22/16 14:57	gss
Strontium, dissolved	M200.7 ICP	1	0.072	*	mg/L	0.005	0.03	03/19/16 15:03	gss
Strontium, total	M200.7 ICP	1	0.072		mg/L	0.005	0.03	03/22/16 14:57	gss
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/22/16 23:47	msh
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/22/16 20:15	msh
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/19/16 15:03	gss
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 13:08	gss
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/19/16 15:03	gss
Titanium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/22/16 14:57	gss
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/22/16 23:47	msh
Uranium, total	M200.8 ICP-MS	1		U *	mg/L	0.0001	0.0005	03/22/16 20:15	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/19/16 15:03	gss
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/22/16 14:57	gss
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/19/16 15:03	gss
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/22/16 14:57	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW5-E

ACZ Sample ID: **L29453-04**
 Date Sampled: 03/14/16 08:15
 Date Received: 03/16/16
 Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	26.2		*	mg/L	2	20	03/22/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Total Alkalinity		1	26.2		*	mg/L	2	20	03/22/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-3.4			%			03/30/16 0:00	calc
Sum of Anions			1.0			meq/L			03/30/16 0:00	calc
Sum of Cations			0.934			meq/L			03/30/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 12:17	abd
Chloride	SM4500Cl-E	1	2.3		*	mg/L	0.5	2	03/25/16 8:47	krh
Conductivity @25C	SM2510B	1	104		*	umhos/cm	1	10	03/22/16 15:17	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/22/16 11:04	mss2
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 21:18	pjb
Fluoride	SM4500F-C	1	0.09	B	*	mg/L	0.05	0.3	03/18/16 16:25	abd
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		30			mg/L	0.2	5	03/30/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/25/16 21:59	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/23/16 10:23	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/21/16 11:59	mss2
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	03/22/16 0:00	abd
pH measured at		1	21.7		*	C	0.1	0.1	03/22/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/30/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/18/16 23:38	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/16/16 21:27	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/23/16 1:26	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	104		*	mg/L	10	20	03/18/16 12:29	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/16/16 16:49	emk
Residue, Total (TS) @ 105C	SM2540B	1	100		*	mg/L	10	20	03/16/16 16:38	emk
Sulfate	D516-02/-07 - Turbidimetric	1	21.1		*	mg/L	1	5	03/24/16 11:42	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/16/16 16:51	sck
TDS (calculated)	Calculation		59.2			mg/L			03/30/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.76						03/30/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW10-E

ACZ Sample ID: **L29453-05**
Date Sampled: 03/14/16 12:00
Date Received: 03/16/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/22/16 9:16	enb
Cyanide, WAD	SM4500-CN I- distillation								03/23/16 7:48	enb
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/20/16 12:40	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 16:30	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/20/16 12:04	spl
Total Hot Plate Digestion	M200.2 ICP								03/19/16 13:50	aeb
Total Hot Plate Digestion	M200.2 ICP-MS								03/21/16 12:48	scp

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW10-E

ACZ Sample ID: **L29453-05**
Date Sampled: 03/14/16 12:00
Date Received: 03/16/16
Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/19/16 15:06	gss
Aluminum, total	M200.7 ICP	1		U		mg/L	0.03	0.2	03/22/16 15:00	gss
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/22/16 23:50	msh
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/22/16 20:18	msh
Arsenic, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	03/22/16 23:50	msh
Arsenic, total	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	03/22/16 20:18	msh
Barium, dissolved	M200.7 ICP	1		U		mg/L	0.003	0.02	03/19/16 15:06	gss
Barium, total	M200.7 ICP	1		U		mg/L	0.003	0.02	03/22/16 15:00	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:06	gss
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 15:00	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/19/16 15:06	gss
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/22/16 15:00	gss
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:06	gss
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 15:00	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 23:50	msh
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/22/16 20:18	msh
Calcium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/19/16 15:06	gss
Calcium, total	M200.7 ICP	1	0.1	B		mg/L	0.1	0.5	03/22/16 15:00	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:06	gss
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 15:00	gss
Cobalt, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/19/16 15:06	gss
Cobalt, total	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/22/16 15:00	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/19/16 15:06	gss
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/22/16 15:00	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/19/16 15:06	gss
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/22/16 15:00	gss
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/19/16 15:06	gss
Iron, total	M200.7 ICP	1		U		mg/L	0.02	0.05	03/22/16 15:00	gss
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/23/16 23:48	mfm
Lead, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/23/16 19:24	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 15:06	gss
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/22/16 15:00	gss
Magnesium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/19/16 15:06	gss
Magnesium, total	M200.7 ICP	1	0.2	B		mg/L	0.2	1	03/22/16 15:00	gss
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/19/16 15:06	gss
Manganese, total	M200.7 ICP	1		U		mg/L	0.005	0.03	03/22/16 15:00	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 16:47	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/25/16 11:01	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/19/16 15:06	gss
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/22/16 15:00	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/19/16 15:06	gss
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/22/16 15:00	gss
Potassium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/19/16 15:06	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW10-E

ACZ Sample ID: **L29453-05**
Date Sampled: 03/14/16 12:00
Date Received: 03/16/16
Sample Matrix: *Surface Water*

Potassium, total	M200.7 ICP	1	U	mg/L	0.2	1	03/22/16 15:00	gss
Scandium, dissolved	M200.7 ICP	1	U *	mg/L	0.1	0.5	03/19/16 15:06	gss
Scandium, total	M200.7 ICP	1	U *	mg/L	0.1	0.5	03/22/16 15:00	gss
Selenium, dissolved	M200.8 ICP-MS	1	U	mg/L	0.0001	0.0003	03/22/16 23:50	msh
Selenium, total	M200.8 ICP-MS	1	U	mg/L	0.0001	0.0003	03/22/16 20:18	msh
Silver, dissolved	M200.8 ICP-MS	1	U	mg/L	0.00005	0.0003	03/22/16 23:50	msh
Silver, total	M200.8 ICP-MS	1	U	mg/L	0.00005	0.0003	03/22/16 20:18	msh
Sodium, dissolved	M200.7 ICP	1	U *	mg/L	0.2	1	03/19/16 15:06	gss
Sodium, total	M200.7 ICP	1	U	mg/L	0.2	1	03/22/16 15:00	gss
Strontium, dissolved	M200.7 ICP	1	U *	mg/L	0.005	0.03	03/19/16 15:06	gss
Strontium, total	M200.7 ICP	1	U	mg/L	0.005	0.03	03/22/16 15:00	gss
Thallium, dissolved	M200.8 ICP-MS	1	U	mg/L	0.0001	0.0005	03/22/16 23:50	msh
Thallium, total	M200.8 ICP-MS	1	U	mg/L	0.0001	0.0005	03/22/16 20:18	msh
Tin, dissolved	M200.7 ICP	1	U	mg/L	0.04	0.2	03/19/16 15:06	gss
Tin, total	M200.7 ICP	1	U	mg/L	0.04	0.2	03/23/16 13:11	gss
Titanium, dissolved	M200.7 ICP	1	U	mg/L	0.005	0.03	03/19/16 15:06	gss
Titanium, total	M200.7 ICP	1	U	mg/L	0.005	0.03	03/22/16 15:00	gss
Uranium, dissolved	M200.8 ICP-MS	1	U	mg/L	0.0001	0.0005	03/22/16 23:50	msh
Uranium, total	M200.8 ICP-MS	1	U *	mg/L	0.0001	0.0005	03/22/16 20:18	msh
Vanadium, dissolved	M200.7 ICP	1	U	mg/L	0.005	0.03	03/19/16 15:06	gss
Vanadium, total	M200.7 ICP	1	U	mg/L	0.005	0.03	03/22/16 15:00	gss
Zinc, dissolved	M200.7 ICP	1	U	mg/L	0.01	0.05	03/19/16 15:06	gss
Zinc, total	M200.7 ICP	1	U	mg/L	0.01	0.05	03/22/16 15:00	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW10-E

ACZ Sample ID: **L29453-05**
 Date Sampled: 03/14/16 12:00
 Date Received: 03/16/16
 Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Total Alkalinity		1		U	*	mg/L	2	20	03/22/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			n/a			%			03/30/16 0:00	calc
Sum of Anions			N/A			meq/L			03/30/16 0:00	calc
Sum of Cations				U		meq/L			03/30/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 12:22	abd
Chloride	SM4500Cl-E	1		U	*	mg/L	0.5	2	03/25/16 9:05	krh
Conductivity @25C	SM2510B	1	1.4	B	*	umhos/cm	1	10	03/22/16 15:24	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/22/16 11:05	mss2
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 21:19	pjb
Fluoride	SM4500F-C	1		U	*	mg/L	0.05	0.3	03/18/16 16:30	abd
Hardness as CaCO3 (dissolved)	SM2340B - Calculation			U		mg/L	0.2	5	03/30/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/25/16 22:01	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/23/16 10:24	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/21/16 12:00	mss2
pH (lab)	SM4500H+ B									
pH		1	6.3	H	*	units	0.1	0.1	03/22/16 0:00	abd
pH measured at		1	21.8		*	C	0.1	0.1	03/22/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/30/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/18/16 23:39	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	03/16/16 21:28	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/23/16 1:27	pjb
Residue, Filterable (TDS) @180C	SM2540C	1		U	*	mg/L	10	20	03/18/16 12:32	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/16/16 16:52	emk
Residue, Total (TS) @ 105C	SM2540B	1		U	*	mg/L	10	20	03/16/16 16:43	emk
Sulfate	D516-02/-07 - Turbidimetric	1		U	*	mg/L	1	5	03/24/16 11:42	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/16/16 16:59	sck
TDS (calculated)	Calculation					mg/L			03/30/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		n/a						03/30/16 0:00	calc



Report Header Explanations

Table with 2 columns: Term and Definition. Includes terms like Batch, Found, Limit, Lower, MDL, PCN/SCN, PQL, QC, Rec, RPD, Upper, and Sample.

QC Sample Types

Table with 4 columns: Code, Description, Code, Description. Lists various QC sample types such as AS, ASD, CCB, CCV, DUP, ICB, ICV, ICSAB, LCSS, LCSSD, LCSW, LCSWD, LFB, LFM, LFMD, LRB, MS, MSD, PBS, PBW, PQV, and SDL.

QC Sample Type Explanations

Table with 2 columns: Sample Type and Explanation. Explains Blanks, Control Samples, Duplicates, Spikes/Fortified Matrix, and Standard.

ACZ Qualifiers (Qual)

Table with 2 columns: Qualifier and Description. Lists qualifiers B, H, L, and U with their respective meanings.

Method References

- List of 5 method references including EPA 600/4-83-020, EPA 600/R-93-100, EPA 600/R-94-111, EPA SW-846, and Standard Methods for the Examination of Water and Wastewater.

Comments

- List of 5 comments explaining QC results, reporting basis (dry weight vs as received), asterisks in columns, and MDL/PQL reporting.

For a complete list of ACZ's Extended Qualifiers, please click: <http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29453-01	WG400264	Total Hot Plate Digestion	M200.2 ICP-MS	DJ	Sample dilution required due to insufficient sample.
	WG400215	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400379	Uranium, total	M200.8 ICP-MS	BF	Target analyte in prep / method blank at or above the acceptance criteria. Target analyte was not detected in the sample [$< MDL$].
	WG400347	Bicarbonate as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($< 10x MDL$).
	WG400548	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400347	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400343	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($< 10x MDL$).
	WG400461	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($< 10x MDL$).
	WG400196	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($< 10x MDL$).
	WG400347	Hydroxide as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400591	Nitrate/Nitrite as N	M353.2 - H ₂ SO ₄ preserved	Q6	Sample was received above recommended temperature.
	WG400394	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($< 10x MDL$).
	WG400271	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($< 10x MDL$).
	WG400347	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG400104	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic	Q6	Sample was received above recommended temperature.

REPAD.15.06.05.01

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			Acid		
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400392		Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400200		Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400096		Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400095		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG400503		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
WG400092		Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400347		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29453-02	WG400215	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400347	Bicarbonate as CaCO3 Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400548	Chloride	SM4500Cl-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG400347	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400343	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400461	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400196	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400347	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400591	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG400394	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400271	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.	
		M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400347	pH pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.	
		SM4500H+ B	Q6	Sample was received above recommended temperature.	
WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.	
		M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	
WG400104	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.	
		M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.	
		M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400392	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400200	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400096	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400095	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG400503	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG400092	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400347	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29453-03	WG400264	Total Hot Plate Digestion	M200.2 ICP-MS	DD	Sample required dilution due to matrix color or odor.
	WG400215	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400347	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400548	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400347	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400343	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400461	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400196	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400347	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400591	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG400394	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400271	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400347	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG400104	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
WG400392		Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400200		Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400096		Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400095		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG400503		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
WG400092		Sulfide as S	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400347		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29453-04	WG400215	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400379	Uranium, total	M200.8 ICP-MS	BF	Target analyte in prep / method blank at or above the acceptance criteria. Target analyte was not detected in the sample [$<$ MDL].
	WG400347	Bicarbonate as CaCO ₃ Carbonate as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400548	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400347	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400343	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400461	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400196	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400347	Hydroxide as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400591	Nitrate/Nitrite as N	M353.2 - H ₂ SO ₄ preserved	Q6	Sample was received above recommended temperature.
	WG400394	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
WG400271	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.	
		M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).	
WG400347	pH pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.	
		SM4500H+ B	Q6	Sample was received above recommended temperature.	
WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.	
		M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	
WG400104	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.	
		M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.	
		M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated	

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG400392	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400200	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400096	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400095	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG400503	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG400092	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400347	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29453-05	WG400215	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400379	Uranium, total	M200.8 ICP-MS	BF	Target analyte in prep / method blank at or above the acceptance criteria. Target analyte was not detected in the sample [$<$ MDL].
	WG400347	Bicarbonate as CaCO ₃ Carbonate as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400548	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400347	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400343	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400461	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400196	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).
	WG400347	Hydroxide as CaCO ₃	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400591	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG400394	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
M350.1 Auto Salicylate w/gas diffusion			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).	
WG400271	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.	
		M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation ($<$ 10x MDL).	
WG400347	pH pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.	
		SM4500H+ B	Q6	Sample was received above recommended temperature.	
WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.	
		M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	
WG400104	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).	
		M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.	

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400392	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400200	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400096	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400095	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG400503	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG400092	Sulfide as S	SM4500S2-D	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400347	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW1-E

ACZ Sample ID: **L29453-01**

Date Sampled: 03/14/16 9:55

Date Received: 03/16/16

Sample Matrix: *Surface Water*

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**

Extract Method: **M3520**

Workgroup: WG400451

Analyst: itm

Extract Date: 03/17/16 10:30

Analysis Date: 03/24/16 10:41

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.02	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	83.5		1.02	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW1-EACZ Sample ID: **L29453-01**

Date Sampled: 03/14/16 9:55

Date Received: 03/16/16

Sample Matrix: Surface Water

Oil & Grease, Total RecoverableAnalysis Method: **1664A - Gravimetric**

Extract Method:

Workgroup: WG400262

Analyst: id

Extract Date:

Analysis Date: 03/21/16 15:10

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		2.6	B	1	*	mg/L	2	10

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW2-EACZ Sample ID: **L29453-02**

Date Sampled: 03/14/16 8:55

Date Received: 03/16/16

Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG400451

Analyst: itm

Extract Date: 03/17/16 10:33

Analysis Date: 03/24/16 11:09

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.06	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	88.3		1.06	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW2-EACZ Sample ID: **L29453-02**

Date Sampled: 03/14/16 8:55

Date Received: 03/16/16

Sample Matrix: *Surface Water***Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**

Extract Method:

Workgroup: WG400262

Analyst: id

Extract Date:

Analysis Date: 03/21/16 15:32

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		2.2	B	1.06	*	mg/L	2.1	10.6

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW4-EACZ Sample ID: **L29453-03**

Date Sampled: 03/14/16 8:15

Date Received: 03/16/16

Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG400451

Analyst: itm

Extract Date: 03/17/16 10:35

Analysis Date: 03/24/16 11:36

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.04	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	84.2		1.04	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW4-EACZ Sample ID: **L29453-03**

Date Sampled: 03/14/16 8:15

Date Received: 03/16/16

Sample Matrix: Surface Water

Oil & Grease, Total RecoverableAnalysis Method: **1664A - Gravimetric**

Extract Method:

Workgroup: WG400262

Analyst: id

Extract Date:

Analysis Date: 03/21/16 15:54

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		3.3	B	1.03	*	mg/L	2.1	10.3

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW5-EACZ Sample ID: **L29453-04**

Date Sampled: 03/14/16 8:15

Date Received: 03/16/16

Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG400451

Analyst: itm

Extract Date: 03/17/16 10:37

Analysis Date: 03/24/16 12:04

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.02	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	88.5		1.02	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW5-EACZ Sample ID: **L29453-04**

Date Sampled: 03/14/16 8:15

Date Received: 03/16/16

Sample Matrix: Surface Water

Oil & Grease, Total RecoverableAnalysis Method: **1664A - Gravimetric**

Extract Method:

Workgroup: WG400262

Analyst: id

Extract Date:

Analysis Date: 03/21/16 16:16

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1	*	mg/L	2	10

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SW10-E

ACZ Sample ID: **L29453-05**

Date Sampled: 03/14/16 12:00

Date Received: 03/16/16

Sample Matrix: *Surface Water***Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG400451

Analyst: itm

Extract Date: 03/17/16 10:40

Analysis Date: 03/24/16 12:31

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	92		1	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW10-EACZ Sample ID: **L29453-05**
Date Sampled: 03/14/16 12:00
Date Received: 03/16/16
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400558

Analyst: id

Extract Date:

Analysis Date: 03/25/16 13:19

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	0.99	*	mg/L	2	9.9

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>LCL</i>	Lower Control Limit
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #4) Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>UCL</i>	Upper Control Limit
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>SURR</i>	Surrogate	<i>LFM</i>	Laboratory Fortified Matrix
<i>INTS</i>	Internal Standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBS</i>	Prep Blank - Soil
<i>LFB</i>	Laboratory Fortified Blank	<i>PBW</i>	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
O	Analyte concentration is estimated due to result exceeding calibration range.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
J	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
- (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Excluding Oil & Grease, solid & biological matrices for organic analyses are reported on a wet weight basis.
- (3) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (4) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

ACZ Project ID: **L29453**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29453-01	WG400451	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400262	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
L29453-02	WG400451	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400262	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
L29453-03	WG400451	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400262	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
L29453-04	WG400451	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400262	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
L29453-05	WG400451	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400558	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29453**

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bismuth, dissolved	M200.7 ICP
Bismuth, total	M200.7 ICP
Gallium, dissolved	M200.7 ICP
Gallium, total	M200.7 ICP
Scandium, dissolved	M200.7 ICP
Scandium, total	M200.7 ICP

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29453
 Date Received: 03/16/2016 09:26
 Received By: ddp
 Date Printed: 3/16/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?		X	

Some parameters were received past hold time.

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
3900	9.8	<=6.0	14	N/A
4053	13.5	<=6.0	13	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29453
Date Received: 03/16/2016 09:26
Received By: ddp
Date Printed: 3/16/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc. **129453**

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza.
Company: Tahoe Resources Inc
E-mail: MBerganza@santafael.com.gt

Address: Bulevar Los Próceres 18 calle 74-69 zona 10
Empresarial, zona Pradera, Torre IV oficina 1406
Telephone: (502) 5951 5248

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tahoe Resources Inc
E-mail: MBerganza@santafael.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: [Signature] I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality
PO#: Escobal
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers											
SW1-E	14/03/16 09:55	SW	10	MS	/									
SW2-E	14/03/16 08:55	SW	11		/									
SW4-E	14/03/16 08:15	SW	10		/									

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Glass bottle for QA/QC of TPH in the other cooler (with samples SWS-E and SW10-E)
COC # 1/2

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[Signature]	14.03.2016 15:20	[Signature]	14.3.16 15:20
		[Signature]	13/6/16 09:27





Guatemala March 14th 2016

To whom it may concern:

Minera San Rafael, S.A is sending a case with samples of water, which is not contaminated, that are going to be analyzed by the ACZ Laboratories in Steamboat Springs, Colorado, USA.

If you have any question or doubt, please contact Miguel Berganza at Minera San Rafael, S.A. (502 - 5951-5248) or Sue Webber at ACZ Laboratories (970-879-6590).

Sincerely yours,

Miguel Berganza
Environment Department.
Mina El Escobal
Minera San Rafael, S.A.

April 01, 2016

Report to:

Miguel Berganza

Tahoe Resources, Inc.

Boulevard Los Proceres 18 c. 24-69 zona 10

Centro

Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza

Tahoe Resources, Inc.

Boulevard Los Proceres 18 c. 24-69 zona 10

Centro

Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29511

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 18, 2016. This project has been assigned to ACZ's project number, L29511. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29511. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

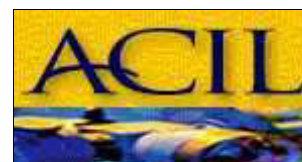
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 01, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

April 01, 2016

Project ID: Escobal

ACZ Project ID: L29511

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 7 miscellaneous samples from Tahoe Resources, Inc. on March 18, 2016. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L29511. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for parameters flagged with "H" flags (H3, HE), received either after the hold time expired or too close to the hold time.

Sample Analysis

These samples were analyzed for inorganic, organic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. For samples with a TDS ratio over 1.2 and a TDS value greater than 150 mg/L, the samples were not retested based on historical re-analysis data and the sample matrix.

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW2A-EACZ Sample ID: **L29511-01**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 14:49	enb
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 10:48	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 13:00	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 15:54	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 13:55	enb
Total Hot Plate Digestion	M200.2 ICP								03/22/16 13:58	gss
Total Hot Plate Digestion	M200.2 ICP-MS								03/24/16 13:00	scp

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW2A-E

ACZ Sample ID: **L29511-01**

Date Sampled: 03/16/16 11:35

Date Received: 03/18/16

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 20:49	aeb
Aluminum, total	M200.7 ICP	1	0.04	B		mg/L	0.03	0.2	03/23/16 17:12	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0114			mg/L	0.0004	0.002	03/29/16 14:42	enb
Antimony, total	M200.8 ICP-MS	1	0.0126			mg/L	0.0004	0.002	03/28/16 17:24	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0080			mg/L	0.0002	0.001	03/29/16 14:42	enb
Arsenic, total	M200.8 ICP-MS	1	0.0086			mg/L	0.0002	0.001	03/28/16 17:24	mfm
Barium, dissolved	M200.7 ICP	1	0.062			mg/L	0.003	0.02	03/23/16 20:49	aeb
Barium, total	M200.7 ICP	1	0.067			mg/L	0.003	0.02	03/23/16 17:12	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 20:49	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:12	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 20:49	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:12	aeb
Boron, dissolved	M200.7 ICP	1	0.15			mg/L	0.01	0.05	03/24/16 11:00	aeb
Boron, total	M200.7 ICP	1	0.16			mg/L	0.01	0.05	03/23/16 17:12	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 14:42	enb
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:24	mfm
Calcium, dissolved	M200.7 ICP	1	390		*	mg/L	0.1	0.5	03/23/16 20:49	aeb
Calcium, total	M200.7 ICP	1	408			mg/L	0.1	0.5	03/23/16 17:12	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 20:49	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:12	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:00	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:12	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 20:49	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:12	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 20:49	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:12	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/23/16 20:49	aeb
Iron, total	M200.7 ICP	1		U		mg/L	0.02	0.05	03/23/16 17:12	aeb
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	03/29/16 14:42	enb
Lead, total	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0005	03/28/16 17:24	mfm
Lithium, dissolved	M200.7 ICP	1	0.092			mg/L	0.008	0.04	03/23/16 20:49	aeb
Lithium, total	M200.7 ICP	1	0.096			mg/L	0.008	0.04	03/23/16 17:12	aeb
Magnesium, dissolved	M200.7 ICP	1	20.1			mg/L	0.2	1	03/23/16 20:49	aeb
Magnesium, total	M200.7 ICP	1	21.4			mg/L	0.2	1	03/23/16 17:12	aeb
Manganese, dissolved	M200.7 ICP	1	0.028	B		mg/L	0.005	0.03	03/23/16 20:49	aeb
Manganese, total	M200.7 ICP	1	0.033			mg/L	0.005	0.03	03/23/16 17:12	aeb
Mercury, dissolved	M245.1 CVAA	1		U	*	mg/L	0.0002	0.001	03/30/16 13:53	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 15:42	pta
Molybdenum, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.02	0.1	03/23/16 20:49	aeb
Molybdenum, total	M200.7 ICP	1	0.03	B		mg/L	0.02	0.1	03/23/16 17:12	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 20:49	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:12	aeb
Potassium, dissolved	M200.7 ICP	1	14.3			mg/L	0.2	1	03/23/16 20:49	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW2A-E

ACZ Sample ID: **L29511-01**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	15.1		mg/L	0.2	1	03/23/16 17:12	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 20:49	aeb
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 17:12	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0010		mg/L	0.0001	0.0003	03/29/16 14:42	enb
Selenium, total	M200.8 ICP-MS	1	0.0010		mg/L	0.0001	0.0003	03/29/16 12:43	enb
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/29/16 14:42	enb
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/28/16 17:24	mfm
Sodium, dissolved	M200.7 ICP	1	81.4		mg/L	0.2	1	03/23/16 20:49	aeb
Sodium, total	M200.7 ICP	1	85.7		mg/L	0.2	1	03/23/16 17:12	aeb
Strontium, dissolved	M200.7 ICP	1	3.940	*	mg/L	0.005	0.03	03/23/16 20:49	aeb
Strontium, total	M200.7 ICP	1	4.310		mg/L	0.005	0.03	03/23/16 17:12	aeb
Thallium, dissolved	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	03/29/16 14:42	enb
Thallium, total	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	03/28/16 17:24	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 20:49	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:12	aeb
Titanium, dissolved	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	03/23/16 20:49	aeb
Titanium, total	M200.7 ICP	1	0.008	B	mg/L	0.005	0.03	03/23/16 17:12	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 14:42	enb
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:24	mfm
Vanadium, dissolved	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	03/23/16 20:49	aeb
Vanadium, total	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/23/16 17:12	aeb
Zinc, dissolved	M200.7 ICP	1	0.01	B	mg/L	0.01	0.05	03/23/16 20:49	aeb
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 17:12	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW2A-E

ACZ Sample ID: **L29511-01**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	35.0		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	35.0		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			04/01/16 0:00	calc
Sum of Anions			25			meq/L			04/01/16 0:00	calc
Sum of Cations			25			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 12:51	abd
Chloride	SM4500Cl-E	1	88		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	2070		*	umhos/cm	1	10	03/23/16 17:58	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:17	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5	0.004	B	*	mg/L	0.003	0.01	03/25/16 11:42	enb
Fluoride	SM4500F-C	1	1.35		*	mg/L	0.05	0.3	03/19/16 16:50	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1060			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	1.40		*	mg/L	0.02	0.1	03/25/16 22:58	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/29/16 9:31	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.3	B	*	mg/L	0.1	0.5	03/24/16 23:14	pjb
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.8		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/25/16 10:32	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/19/16 13:08	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/29/16 14:19	spl
Residue, Filterable (TDS) @180C	SM2540C	1	1790		*	mg/L	10	20	03/22/16 11:11	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/18/16 15:02	emk
Residue, Total (TS) @ 105C	SM2540B	1	1790		*	mg/L	10	20	03/22/16 10:10	sck
Sulfate	D516-02/-07 - Turbidimetric	50	1040		*	mg/L	50	250	03/28/16 12:02	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 14:33	sck
TDS (calculated)	Calculation		1660			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.08						04/01/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW3-E

ACZ Sample ID: **L29511-02**
Date Sampled: 03/16/16 11:10
Date Received: 03/18/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 14:56	enb
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 11:05	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 13:10	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 16:02	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 14:05	enb
Total Hot Plate Digestion	M200.2 ICP								03/22/16 14:13	gss
Total Hot Plate Digestion	M200.2 ICP-MS								03/24/16 13:12	scp

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW3-E

ACZ Sample ID: **L29511-02**
Date Sampled: 03/16/16 11:10
Date Received: 03/18/16
Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 20:59	aeb
Aluminum, total	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 17:16	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/24/16 17:36	mfm
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/28/16 17:27	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0090			mg/L	0.0002	0.001	03/29/16 14:46	enb
Arsenic, total	M200.8 ICP-MS	1	0.0096			mg/L	0.0002	0.001	03/28/16 17:27	mfm
Barium, dissolved	M200.7 ICP	1	0.104			mg/L	0.003	0.02	03/23/16 20:59	aeb
Barium, total	M200.7 ICP	1	0.110			mg/L	0.003	0.02	03/23/16 17:16	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 20:59	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:16	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 20:59	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:16	aeb
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:09	aeb
Boron, total	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/23/16 17:16	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/24/16 17:36	mfm
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:27	mfm
Calcium, dissolved	M200.7 ICP	1	33.8		*	mg/L	0.1	0.5	03/23/16 20:59	aeb
Calcium, total	M200.7 ICP	1	34.8			mg/L	0.1	0.5	03/23/16 17:16	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 20:59	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:16	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:09	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:16	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 20:59	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:16	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 20:59	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:16	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/23/16 20:59	aeb
Iron, total	M200.7 ICP	1	0.04	B		mg/L	0.02	0.05	03/23/16 17:16	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 14:46	enb
Lead, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:27	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 20:59	aeb
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:16	aeb
Magnesium, dissolved	M200.7 ICP	1	2.8			mg/L	0.2	1	03/23/16 20:59	aeb
Magnesium, total	M200.7 ICP	1	3			mg/L	0.2	1	03/23/16 17:16	aeb
Manganese, dissolved	M200.7 ICP	1	0.026	B		mg/L	0.005	0.03	03/23/16 20:59	aeb
Manganese, total	M200.7 ICP	1	0.032			mg/L	0.005	0.03	03/23/16 17:16	aeb
Mercury, dissolved	M245.1 CVAA	1		U	*	mg/L	0.0002	0.001	03/30/16 13:55	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 15:44	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 20:59	aeb
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 17:16	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 20:59	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:16	aeb
Potassium, dissolved	M200.7 ICP	1	4.3			mg/L	0.2	1	03/23/16 20:59	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW3-E

ACZ Sample ID: **L29511-02**
Date Sampled: 03/16/16 11:10
Date Received: 03/18/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	4.4		mg/L	0.2	1	03/23/16 17:16	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 20:59	aeb
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 17:16	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/24/16 17:36	mfm
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/29/16 12:46	enb
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/24/16 17:36	mfm
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/28/16 17:27	mfm
Sodium, dissolved	M200.7 ICP	1	13.7		mg/L	0.2	1	03/23/16 20:59	aeb
Sodium, total	M200.7 ICP	1	14.1		mg/L	0.2	1	03/23/16 17:16	aeb
Strontium, dissolved	M200.7 ICP	1	0.182		mg/L	0.005	0.03	03/23/16 20:59	aeb
Strontium, total	M200.7 ICP	1	0.190		mg/L	0.005	0.03	03/23/16 17:16	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 14:46	enb
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:27	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 20:59	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:16	aeb
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 20:59	aeb
Titanium, total	M200.7 ICP	1	0.005	B	mg/L	0.005	0.03	03/23/16 17:16	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 14:46	enb
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:27	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 20:59	aeb
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 17:16	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 20:59	aeb
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 17:16	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW3-E

ACZ Sample ID: **L29511-02**
Date Sampled: 03/16/16 11:10
Date Received: 03/18/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	111		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1	2.8	B	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	114		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-3.7			%			04/01/16 0:00	calc
Sum of Anions			2.8			meq/L			04/01/16 0:00	calc
Sum of Cations			2.6			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 12:56	abd
Chloride	SM4500Cl-E	1	3		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	260		*	umhos/cm	1	10	03/23/16 18:07	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:18	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 11:20	enb
Fluoride	SM4500F-C	1	0.18	B	*	mg/L	0.05	0.3	03/25/16 13:30	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		96			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/25/16 22:59	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/29/16 9:33	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/24/16 23:15	pjb
pH (lab)	SM4500H+ B									
pH		1	8.4	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.4		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/25/16 10:33	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	03/19/16 13:09	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	03/29/16 14:20	spl
Residue, Filterable (TDS) @180C	SM2540C	1	212		*	mg/L	10	20	03/22/16 11:14	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/18/16 15:05	emk
Residue, Total (TS) @ 105C	SM2540B	1	208		*	mg/L	10	20	03/22/16 10:12	sck
Sulfate	D516-02/-07 - Turbidimetric	1	18.8		*	mg/L	1	5	03/28/16 11:38	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 14:39	sck
TDS (calculated)	Calculation		146			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.45						04/01/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4A-E

ACZ Sample ID: **L29511-03**
Date Sampled: 03/16/16 11:00
Date Received: 03/18/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 15:03	enb
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 11:13	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 13:40	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 16:10	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 14:15	enb
Total Hot Plate Digestion	M200.2 ICP-MS				*				03/24/16 13:24	scp
Total Hot Plate Digestion	M200.2 ICP								03/22/16 14:28	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4A-E

ACZ Sample ID: **L29511-03**

Date Sampled: 03/16/16 11:00

Date Received: 03/18/16

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 21:02	aeb
Aluminum, total	M200.7 ICP	1	0.54			mg/L	0.03	0.2	03/23/16 17:19	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0057			mg/L	0.0004	0.002	03/29/16 14:49	enb
Antimony, total	M200.8 ICP-MS	2	0.0068			mg/L	0.0008	0.004	03/28/16 17:31	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0061			mg/L	0.0002	0.001	03/29/16 14:49	enb
Arsenic, total	M200.8 ICP-MS	2	0.0068			mg/L	0.0004	0.002	03/28/16 17:31	mfm
Barium, dissolved	M200.7 ICP	1	0.118			mg/L	0.003	0.02	03/23/16 21:02	aeb
Barium, total	M200.7 ICP	1	0.134			mg/L	0.003	0.02	03/23/16 17:19	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:02	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:19	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 21:02	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:19	aeb
Boron, dissolved	M200.7 ICP	1	0.10			mg/L	0.01	0.05	03/24/16 11:13	aeb
Boron, total	M200.7 ICP	1	0.12			mg/L	0.01	0.05	03/23/16 17:19	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 14:49	enb
Cadmium, total	M200.8 ICP-MS	2		U		mg/L	0.0002	0.001	03/28/16 17:31	mfm
Calcium, dissolved	M200.7 ICP	1	298		*	mg/L	0.1	0.5	03/23/16 21:02	aeb
Calcium, total	M200.7 ICP	1	314			mg/L	0.1	0.5	03/23/16 17:19	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:02	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:19	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:13	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:19	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:02	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:19	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 21:02	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:19	aeb
Iron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.02	0.05	03/23/16 21:02	aeb
Iron, total	M200.7 ICP	1	0.45			mg/L	0.02	0.05	03/23/16 17:19	aeb
Lead, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	03/29/16 14:49	enb
Lead, total	M200.8 ICP-MS	2	0.0015			mg/L	0.0002	0.001	03/28/16 17:31	mfm
Lithium, dissolved	M200.7 ICP	1	0.058			mg/L	0.008	0.04	03/23/16 21:02	aeb
Lithium, total	M200.7 ICP	1	0.059			mg/L	0.008	0.04	03/23/16 17:19	aeb
Magnesium, dissolved	M200.7 ICP	1	19.2			mg/L	0.2	1	03/23/16 21:02	aeb
Magnesium, total	M200.7 ICP	1	20.1			mg/L	0.2	1	03/23/16 17:19	aeb
Manganese, dissolved	M200.7 ICP	1	0.291			mg/L	0.005	0.03	03/23/16 21:02	aeb
Manganese, total	M200.7 ICP	1	0.374			mg/L	0.005	0.03	03/23/16 17:19	aeb
Mercury, dissolved	M245.1 CVAA	1		U	*	mg/L	0.0002	0.001	03/30/16 13:57	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 15:46	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 21:02	aeb
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 17:19	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 21:02	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:19	aeb
Potassium, dissolved	M200.7 ICP	1	16			mg/L	0.2	1	03/23/16 21:02	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4A-E

ACZ Sample ID: **L29511-03**
Date Sampled: 03/16/16 11:00
Date Received: 03/18/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	15.5		mg/L	0.2	1	03/23/16 17:19	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 21:02	aeb
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 17:19	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0007		mg/L	0.0001	0.0003	03/29/16 14:49	enb
Selenium, total	M200.8 ICP-MS	2	0.0007		mg/L	0.0002	0.0005	03/29/16 12:49	enb
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/29/16 14:49	enb
Silver, total	M200.8 ICP-MS	2		U	mg/L	0.0001	0.0005	03/28/16 17:31	mfm
Sodium, dissolved	M200.7 ICP	1	64.3		mg/L	0.2	1	03/23/16 21:02	aeb
Sodium, total	M200.7 ICP	1	67.3		mg/L	0.2	1	03/23/16 17:19	aeb
Strontium, dissolved	M200.7 ICP	1	2.800	*	mg/L	0.005	0.03	03/23/16 21:02	aeb
Strontium, total	M200.7 ICP	1	2.980		mg/L	0.005	0.03	03/23/16 17:19	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 14:49	enb
Thallium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.001	03/28/16 17:31	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 21:02	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:19	aeb
Titanium, dissolved	M200.7 ICP	1	0.010	B	mg/L	0.005	0.03	03/23/16 21:02	aeb
Titanium, total	M200.7 ICP	1	0.027	B	mg/L	0.005	0.03	03/23/16 17:19	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	03/29/16 14:49	enb
Uranium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.001	03/28/16 17:31	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 21:02	aeb
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 17:19	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 21:02	aeb
Zinc, total	M200.7 ICP	1	0.04	B	mg/L	0.01	0.05	03/23/16 17:19	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4A-E

ACZ Sample ID: **L29511-03**
Date Sampled: 03/16/16 11:00
Date Received: 03/18/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	68.8		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	68.8		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			04/01/16 0:00	calc
Sum of Anions			20			meq/L			04/01/16 0:00	calc
Sum of Cations			20			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1	63		*	mg/L	10	20	03/21/16 13:01	abd
Chloride	SM4500Cl-E	1	69.5		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	1700		*	umhos/cm	1	10	03/23/16 18:16	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:19	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 11:45	enb
Fluoride	SM4500F-C	1	0.87		*	mg/L	0.05	0.3	03/25/16 13:34	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		823			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	3.36		*	mg/L	0.06	0.3	03/25/16 23:39	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	2.07		*	mg/L	0.05	0.2	03/29/16 9:36	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	2	6.1		*	mg/L	0.2	1	03/24/16 23:38	pjb
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.1		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus		1.40			mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.45		*	mg/L	0.02	0.05	03/25/16 10:36	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.38	H	*	mg/L	0.02	0.05	03/19/16 13:11	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	2	1.18		*	mg/L	0.04	0.1	03/29/16 14:46	spl
Residue, Filterable (TDS) @180C	SM2540C	1	1410		*	mg/L	10	20	03/22/16 11:17	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1	26.0		*	mg/L	5	20	03/18/16 15:08	emk
Residue, Total (TS) @ 105C	SM2540B	1	1460		*	mg/L	10	20	03/22/16 10:14	sck
Sulfate	D516-02/-07 - Turbidimetric	20	783		*	mg/L	20	100	03/28/16 11:52	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 14:45	sck
TDS (calculated)	Calculation		1300			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.08						04/01/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW6-E

ACZ Sample ID: **L29511-04**
 Date Sampled: 03/16/16 08:25
 Date Received: 03/18/16
 Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 15:10	enb
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 11:22	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 14:00	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 16:18	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 14:25	enb
Total Hot Plate Digestion	M200.2 ICP-MS								03/24/16 13:36	scp
Total Hot Plate Digestion	M200.2 ICP								03/22/16 14:43	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW6-E

ACZ Sample ID: **L29511-04**
Date Sampled: 03/16/16 08:25
Date Received: 03/18/16
Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 21:05	aeb
Aluminum, total	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 17:22	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/29/16 15:04	enb
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/28/16 17:34	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0034			mg/L	0.0002	0.001	03/29/16 15:04	enb
Arsenic, total	M200.8 ICP-MS	1	0.0039			mg/L	0.0002	0.001	03/28/16 17:34	mfm
Barium, dissolved	M200.7 ICP	1	0.067			mg/L	0.003	0.02	03/23/16 21:05	aeb
Barium, total	M200.7 ICP	1	0.074			mg/L	0.003	0.02	03/23/16 17:22	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:05	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:22	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 21:05	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:22	aeb
Boron, dissolved	M200.7 ICP	1	0.26			mg/L	0.01	0.05	03/24/16 11:16	aeb
Boron, total	M200.7 ICP	1	0.29			mg/L	0.01	0.05	03/23/16 17:22	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:04	enb
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:34	mfm
Calcium, dissolved	M200.7 ICP	1	16.3		*	mg/L	0.1	0.5	03/23/16 21:05	aeb
Calcium, total	M200.7 ICP	1	17.4			mg/L	0.1	0.5	03/23/16 17:22	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:05	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:22	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:16	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:22	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:05	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:22	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 21:05	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:22	aeb
Iron, dissolved	M200.7 ICP	1	0.05			mg/L	0.02	0.05	03/23/16 21:05	aeb
Iron, total	M200.7 ICP	1	0.10			mg/L	0.02	0.05	03/23/16 17:22	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:04	enb
Lead, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:34	mfm
Lithium, dissolved	M200.7 ICP	1	0.085			mg/L	0.008	0.04	03/23/16 21:05	aeb
Lithium, total	M200.7 ICP	1	0.092			mg/L	0.008	0.04	03/23/16 17:22	aeb
Magnesium, dissolved	M200.7 ICP	1	3			mg/L	0.2	1	03/23/16 21:05	aeb
Magnesium, total	M200.7 ICP	1	3.3			mg/L	0.2	1	03/23/16 17:22	aeb
Manganese, dissolved	M200.7 ICP	1	0.023	B		mg/L	0.005	0.03	03/23/16 21:05	aeb
Manganese, total	M200.7 ICP	1	0.025	B		mg/L	0.005	0.03	03/23/16 17:22	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/31/16 15:49	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 15:48	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 21:05	aeb
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 17:22	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 21:05	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:22	aeb
Potassium, dissolved	M200.7 ICP	1	4			mg/L	0.2	1	03/23/16 21:05	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW6-E

ACZ Sample ID: **L29511-04**
Date Sampled: 03/16/16 08:25
Date Received: 03/18/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	4.3		mg/L	0.2	1	03/23/16 17:22	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 21:05	aeb
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 17:22	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/29/16 15:04	enb
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/29/16 12:52	enb
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/29/16 15:04	enb
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/28/16 17:34	mfm
Sodium, dissolved	M200.7 ICP	1	24.2		mg/L	0.2	1	03/23/16 21:05	aeb
Sodium, total	M200.7 ICP	1	25.8		mg/L	0.2	1	03/23/16 17:22	aeb
Strontium, dissolved	M200.7 ICP	1	0.118		mg/L	0.005	0.03	03/23/16 21:05	aeb
Strontium, total	M200.7 ICP	1	0.129		mg/L	0.005	0.03	03/23/16 17:22	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 15:04	enb
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:34	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 21:05	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:22	aeb
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 21:05	aeb
Titanium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 17:22	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 15:04	enb
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:34	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 21:05	aeb
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 17:22	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 21:05	aeb
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 17:22	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW6-E

ACZ Sample ID: **L29511-04**
 Date Sampled: 03/16/16 08:25
 Date Received: 03/18/16
 Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	51.5		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	51.5		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-6.4			%			04/01/16 0:00	calc
Sum of Anions			2.5			meq/L			04/01/16 0:00	calc
Sum of Cations			2.2			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 13:06	abd
Chloride	SM4500Cl-E	1	31.2		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	257		*	umhos/cm	1	10	03/23/16 18:25	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:20	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 11:22	enb
Fluoride	SM4500F-C	1	0.15	B	*	mg/L	0.05	0.3	03/25/16 13:37	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		53			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/25/16 23:04	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/29/16 9:42	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.1	B	*	mg/L	0.1	0.5	03/24/16 23:23	pjb
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.0		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/25/16 10:38	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	03/19/16 13:12	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	03/29/16 14:25	spl
Residue, Filterable (TDS) @180C	SM2540C	1	176		*	mg/L	10	20	03/22/16 11:19	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/18/16 15:10	emk
Residue, Total (TS) @ 105C	SM2540B	1	172		*	mg/L	10	20	03/22/16 10:16	sck
Sulfate	D516-02/-07 - Turbidimetric	1	27.8		*	mg/L	1	5	03/28/16 11:38	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 15:03	sck
TDS (calculated)	Calculation		138			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.28						04/01/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW8-E

ACZ Sample ID: **L29511-05**
Date Sampled: 03/16/16 10:15
Date Received: 03/18/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 15:17	enb
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 11:30	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 14:20	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 16:26	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 14:35	enb
Total Hot Plate Digestion	M200.2 ICP								03/22/16 14:58	gss
Total Hot Plate Digestion	M200.2 ICP-MS				*				03/24/16 13:48	scp

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW8-E

ACZ Sample ID: **L29511-05**
 Date Sampled: 03/16/16 10:15
 Date Received: 03/18/16
 Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 21:15	aeb
Aluminum, total	M200.7 ICP	1	0.22			mg/L	0.03	0.2	03/23/16 17:25	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0017	B		mg/L	0.0004	0.002	03/29/16 15:07	enb
Antimony, total	M200.8 ICP-MS	2	0.0019	B		mg/L	0.0008	0.004	03/28/16 17:43	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0037			mg/L	0.0002	0.001	03/29/16 15:07	enb
Arsenic, total	M200.8 ICP-MS	2	0.0046			mg/L	0.0004	0.002	03/28/16 17:43	mfm
Barium, dissolved	M200.7 ICP	1	0.120			mg/L	0.003	0.02	03/23/16 21:15	aeb
Barium, total	M200.7 ICP	1	0.133			mg/L	0.003	0.02	03/23/16 17:25	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:15	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:25	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 21:15	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:25	aeb
Boron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	03/24/16 11:19	aeb
Boron, total	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	03/23/16 17:25	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:07	enb
Cadmium, total	M200.8 ICP-MS	2		U		mg/L	0.0002	0.001	03/28/16 17:43	mfm
Calcium, dissolved	M200.7 ICP	1	102		*	mg/L	0.1	0.5	03/23/16 21:15	aeb
Calcium, total	M200.7 ICP	1	102			mg/L	0.1	0.5	03/23/16 17:25	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:15	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:25	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:19	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:25	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:15	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:25	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 21:15	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:25	aeb
Iron, dissolved	M200.7 ICP	1	0.07			mg/L	0.02	0.05	03/23/16 21:15	aeb
Iron, total	M200.7 ICP	1	0.41			mg/L	0.02	0.05	03/23/16 17:25	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:07	enb
Lead, total	M200.8 ICP-MS	2	0.0006	B		mg/L	0.0002	0.001	03/28/16 17:43	mfm
Lithium, dissolved	M200.7 ICP	1	0.023	B		mg/L	0.008	0.04	03/23/16 21:15	aeb
Lithium, total	M200.7 ICP	1	0.021	B		mg/L	0.008	0.04	03/23/16 17:25	aeb
Magnesium, dissolved	M200.7 ICP	1	8.5			mg/L	0.2	1	03/23/16 21:15	aeb
Magnesium, total	M200.7 ICP	1	8.9			mg/L	0.2	1	03/23/16 17:25	aeb
Manganese, dissolved	M200.7 ICP	1	0.156			mg/L	0.005	0.03	03/23/16 21:15	aeb
Manganese, total	M200.7 ICP	1	0.179			mg/L	0.005	0.03	03/23/16 17:25	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/31/16 15:51	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 15:50	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 21:15	aeb
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 17:25	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 21:15	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:25	aeb
Potassium, dissolved	M200.7 ICP	1	9.7			mg/L	0.2	1	03/23/16 21:15	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW8-E

ACZ Sample ID: **L29511-05**
Date Sampled: 03/16/16 10:15
Date Received: 03/18/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	10.1		mg/L	0.2	1	03/23/16 17:25	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 21:15	aeb
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 17:25	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0003	03/29/16 15:07	enb
Selenium, total	M200.8 ICP-MS	2	0.0003	B	mg/L	0.0002	0.0005	03/28/16 17:43	mfm
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/29/16 15:07	enb
Silver, total	M200.8 ICP-MS	2		U	mg/L	0.0001	0.0005	03/28/16 17:43	mfm
Sodium, dissolved	M200.7 ICP	1	32.2		mg/L	0.2	1	03/23/16 21:15	aeb
Sodium, total	M200.7 ICP	1	33.2		mg/L	0.2	1	03/23/16 17:25	aeb
Strontium, dissolved	M200.7 ICP	1	0.963		mg/L	0.005	0.03	03/23/16 21:15	aeb
Strontium, total	M200.7 ICP	1	0.985		mg/L	0.005	0.03	03/23/16 17:25	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 15:07	enb
Thallium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.001	03/28/16 17:43	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 21:15	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:25	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/23/16 21:15	aeb
Titanium, total	M200.7 ICP	1	0.018	B	mg/L	0.005	0.03	03/23/16 17:25	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 15:07	enb
Uranium, total	M200.8 ICP-MS	2		U	mg/L	0.0002	0.001	03/28/16 17:43	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 21:15	aeb
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 17:25	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 21:15	aeb
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 17:25	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW8-E

ACZ Sample ID: **L29511-05**
Date Sampled: 03/16/16 10:15
Date Received: 03/18/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	85.4		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	85.4		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			4.1			%			04/01/16 0:00	calc
Sum of Anions			7.0			meq/L			04/01/16 0:00	calc
Sum of Cations			7.6			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1	13	B	*	mg/L	10	20	03/21/16 13:30	abd
Chloride	SM4500Cl-E	1	28.8		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	745		*	umhos/cm	1	10	03/23/16 19:07	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:21	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 11:23	enb
Fluoride	SM4500F-C	1	0.34		*	mg/L	0.05	0.3	03/25/16 13:41	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		290			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.95		*	mg/L	0.02	0.1	03/25/16 23:11	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.76		*	mg/L	0.05	0.2	03/29/16 9:43	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	1.3		*	mg/L	0.1	0.5	03/24/16 23:25	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.6		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus		0.74			mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.24		*	mg/L	0.02	0.05	03/25/16 10:39	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.22	H	*	mg/L	0.02	0.05	03/19/16 13:15	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.26		*	mg/L	0.02	0.05	03/29/16 14:26	spl
Residue, Filterable (TDS) @180C	SM2540C	1	542		*	mg/L	10	20	03/22/16 11:22	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/18/16 15:13	emk
Residue, Total (TS) @ 105C	SM2540B	1	572		*	mg/L	10	20	03/22/16 10:18	sck
Sulfate	D516-02/-07 - Turbidimetric	20	214		*	mg/L	20	100	03/28/16 11:53	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 15:20	sck
TDS (calculated)	Calculation		450			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.20						04/01/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW9-E

ACZ Sample ID: **L29511-06**
Date Sampled: 03/16/16 09:05
Date Received: 03/18/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 15:25	enb
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 11:39	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 14:30	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 16:34	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 14:45	enb
Total Hot Plate Digestion	M200.2 ICP								03/22/16 15:44	gss
Total Hot Plate Digestion	M200.2 ICP-MS								03/24/16 14:24	scp

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW9-E

ACZ Sample ID: **L29511-06**

Date Sampled: 03/16/16 09:05

Date Received: 03/18/16

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 21:18	aeb
Aluminum, total	M200.7 ICP	1	0.19	B		mg/L	0.03	0.2	03/23/16 17:41	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0004	B		mg/L	0.0004	0.002	03/29/16 15:10	enb
Antimony, total	M200.8 ICP-MS	1	0.0006	B		mg/L	0.0004	0.002	03/28/16 17:52	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0044			mg/L	0.0002	0.001	03/29/16 15:10	enb
Arsenic, total	M200.8 ICP-MS	1	0.0050			mg/L	0.0002	0.001	03/28/16 17:52	mfm
Barium, dissolved	M200.7 ICP	1	0.111			mg/L	0.003	0.02	03/23/16 21:18	aeb
Barium, total	M200.7 ICP	1	0.117			mg/L	0.003	0.02	03/23/16 17:41	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:18	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:41	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 21:18	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:41	aeb
Boron, dissolved	M200.7 ICP	1	0.13			mg/L	0.01	0.05	03/24/16 11:22	aeb
Boron, total	M200.7 ICP	1	0.15			mg/L	0.01	0.05	03/23/16 17:41	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:10	enb
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:52	mfm
Calcium, dissolved	M200.7 ICP	1	61.9		*	mg/L	0.1	0.5	03/23/16 21:18	aeb
Calcium, total	M200.7 ICP	1	60.8			mg/L	0.1	0.5	03/23/16 17:41	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:18	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:41	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:22	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:41	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:18	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:41	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 21:18	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:41	aeb
Iron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.02	0.05	03/23/16 21:18	aeb
Iron, total	M200.7 ICP	1	0.20			mg/L	0.02	0.05	03/23/16 17:41	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:10	enb
Lead, total	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	03/28/16 17:52	mfm
Lithium, dissolved	M200.7 ICP	1	0.041			mg/L	0.008	0.04	03/23/16 21:18	aeb
Lithium, total	M200.7 ICP	1	0.040			mg/L	0.008	0.04	03/23/16 17:41	aeb
Magnesium, dissolved	M200.7 ICP	1	8.9			mg/L	0.2	1	03/23/16 21:18	aeb
Magnesium, total	M200.7 ICP	1	9			mg/L	0.2	1	03/23/16 17:41	aeb
Manganese, dissolved	M200.7 ICP	1	0.111			mg/L	0.005	0.03	03/23/16 21:18	aeb
Manganese, total	M200.7 ICP	1	0.154			mg/L	0.005	0.03	03/23/16 17:41	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/31/16 15:53	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 15:52	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 21:18	aeb
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	03/23/16 17:41	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 21:18	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:41	aeb
Potassium, dissolved	M200.7 ICP	1	6.7			mg/L	0.2	1	03/23/16 21:18	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW9-E

ACZ Sample ID: **L29511-06**
Date Sampled: 03/16/16 09:05
Date Received: 03/18/16
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	6.8		mg/L	0.2	1	03/23/16 17:41	aeb
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 21:18	aeb
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	03/23/16 17:41	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	03/29/16 15:10	enb
Selenium, total	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0003	03/28/16 17:52	mfm
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/29/16 15:10	enb
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/28/16 17:52	mfm
Sodium, dissolved	M200.7 ICP	1	31.2		mg/L	0.2	1	03/23/16 21:18	aeb
Sodium, total	M200.7 ICP	1	31.4		mg/L	0.2	1	03/23/16 17:41	aeb
Strontium, dissolved	M200.7 ICP	1	0.533		mg/L	0.005	0.03	03/23/16 21:18	aeb
Strontium, total	M200.7 ICP	1	0.535		mg/L	0.005	0.03	03/23/16 17:41	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 15:10	enb
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:52	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 21:18	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:41	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/23/16 21:18	aeb
Titanium, total	M200.7 ICP	1	0.013	B	mg/L	0.005	0.03	03/23/16 17:41	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	03/29/16 15:10	enb
Uranium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	03/28/16 17:52	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 21:18	aeb
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	03/23/16 17:41	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 21:18	aeb
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 17:41	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: SW9-E

ACZ Sample ID: **L29511-06**
 Date Sampled: 03/16/16 09:05
 Date Received: 03/18/16
 Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	87.2		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	87.2		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-1.8			%			04/01/16 0:00	calc
Sum of Anions			5.6			meq/L			04/01/16 0:00	calc
Sum of Cations			5.4			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 13:35	abd
Chloride	SM4500Cl-E	1	31.5		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	562		*	umhos/cm	1	10	03/23/16 19:15	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:21	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 11:25	enb
Fluoride	SM4500F-C	1	0.29	B	*	mg/L	0.05	0.3	03/25/16 13:45	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		191			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.97		*	mg/L	0.02	0.1	03/25/16 23:12	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/29/16 9:45	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	03/24/16 23:27	pjb
pH (lab)	SM4500H+ B									
pH		1	8.3	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.5		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus		0.47			mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.15		*	mg/L	0.02	0.05	03/25/16 10:40	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.15	H	*	mg/L	0.02	0.05	03/19/16 13:16	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.17		*	mg/L	0.02	0.05	03/29/16 14:27	spl
Residue, Filterable (TDS) @180C	SM2540C	1	406		*	mg/L	10	20	03/22/16 11:24	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/18/16 15:15	emk
Residue, Total (TS) @ 105C	SM2540B	1	420		*	mg/L	10	20	03/22/16 10:20	sck
Sulfate	D516-02/-07 - Turbidimetric	5	140		*	mg/L	5	25	03/28/16 11:45	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 15:26	sck
TDS (calculated)	Calculation		334			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.22						04/01/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW11-E

ACZ Sample ID: **L29511-07**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/25/16 9:59	bsu
Cyanide, WAD	SM4500-CN I- distillation								03/24/16 11:47	bsu
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/24/16 14:40	mss2
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/24/16 16:42	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/28/16 14:55	enb
Total Hot Plate Digestion	M200.2 ICP-MS								03/24/16 14:36	scp
Total Hot Plate Digestion	M200.2 ICP								03/22/16 15:59	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW11-E

ACZ Sample ID: **L29511-07**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 21:21	aeb
Aluminum, total	M200.7 ICP	1		U		mg/L	0.03	0.2	03/23/16 17:44	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0114			mg/L	0.0004	0.002	03/29/16 15:14	enb
Antimony, total	M200.8 ICP-MS	1	0.0125			mg/L	0.0004	0.002	03/28/16 17:55	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0080			mg/L	0.0002	0.001	03/29/16 15:14	enb
Arsenic, total	M200.8 ICP-MS	1	0.0083			mg/L	0.0002	0.001	03/28/16 17:55	mfm
Barium, dissolved	M200.7 ICP	1	0.062			mg/L	0.003	0.02	03/23/16 21:21	aeb
Barium, total	M200.7 ICP	1	0.066			mg/L	0.003	0.02	03/23/16 17:44	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:21	aeb
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:44	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 21:21	aeb
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/23/16 17:44	aeb
Boron, dissolved	M200.7 ICP	1	0.14			mg/L	0.01	0.05	03/24/16 11:32	aeb
Boron, total	M200.7 ICP	1	0.16			mg/L	0.01	0.05	03/23/16 17:44	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/29/16 15:14	enb
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/28/16 17:55	mfm
Calcium, dissolved	M200.7 ICP	1	393		*	mg/L	0.1	0.5	03/23/16 21:21	aeb
Calcium, total	M200.7 ICP	1	397			mg/L	0.1	0.5	03/23/16 17:44	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:21	aeb
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:44	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/24/16 11:32	aeb
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:44	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 21:21	aeb
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	03/23/16 17:44	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 21:21	aeb
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/23/16 17:44	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/23/16 21:21	aeb
Iron, total	M200.7 ICP	1		U		mg/L	0.02	0.05	03/23/16 17:44	aeb
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	03/29/16 15:14	enb
Lead, total	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0005	03/28/16 17:55	mfm
Lithium, dissolved	M200.7 ICP	1	0.092			mg/L	0.008	0.04	03/23/16 21:21	aeb
Lithium, total	M200.7 ICP	1	0.093			mg/L	0.008	0.04	03/23/16 17:44	aeb
Magnesium, dissolved	M200.7 ICP	1	20.3			mg/L	0.2	1	03/23/16 21:21	aeb
Magnesium, total	M200.7 ICP	1	20.8			mg/L	0.2	1	03/23/16 17:44	aeb
Manganese, dissolved	M200.7 ICP	1	0.028	B		mg/L	0.005	0.03	03/23/16 21:21	aeb
Manganese, total	M200.7 ICP	1	0.031			mg/L	0.005	0.03	03/23/16 17:44	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/31/16 15:55	pta
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/30/16 16:02	pta
Molybdenum, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.02	0.1	03/23/16 21:21	aeb
Molybdenum, total	M200.7 ICP	1	0.03	B		mg/L	0.02	0.1	03/23/16 17:44	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 21:21	aeb
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	03/23/16 17:44	aeb
Potassium, dissolved	M200.7 ICP	1	14.3			mg/L	0.2	1	03/23/16 21:21	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW11-E

ACZ Sample ID: **L29511-07**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: *Surface Water*

Potassium, total	M200.7 ICP	1	14.8		mg/L	0.2	1	03/23/16 17:44	aeb
Scandium, dissolved	M200.7 ICP	1		U	mg/L	0.1	0.5	03/23/16 21:21	aeb
Scandium, total	M200.7 ICP	1		U	mg/L	0.1	0.5	03/23/16 17:44	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0010		mg/L	0.0001	0.0003	03/29/16 15:14	enb
Selenium, total	M200.8 ICP-MS	1	0.0011		mg/L	0.0001	0.0003	03/28/16 17:55	mfm
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/29/16 15:14	enb
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	03/28/16 17:55	mfm
Sodium, dissolved	M200.7 ICP	1	81.5		mg/L	0.2	1	03/23/16 21:21	aeb
Sodium, total	M200.7 ICP	1	84		mg/L	0.2	1	03/23/16 17:44	aeb
Strontium, dissolved	M200.7 ICP	1	3.980		mg/L	0.005	0.03	03/23/16 21:21	aeb
Strontium, total	M200.7 ICP	1	4.130		mg/L	0.005	0.03	03/23/16 17:44	aeb
Thallium, dissolved	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	03/29/16 15:14	enb
Thallium, total	M200.8 ICP-MS	1	0.0003	B	mg/L	0.0001	0.0005	03/28/16 17:55	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 21:21	aeb
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	03/23/16 17:44	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/23/16 21:21	aeb
Titanium, total	M200.7 ICP	1	0.008	B	mg/L	0.005	0.03	03/23/16 17:44	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/29/16 15:14	enb
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	03/28/16 17:55	mfm
Vanadium, dissolved	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/23/16 21:21	aeb
Vanadium, total	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	03/23/16 17:44	aeb
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 21:21	aeb
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	03/23/16 17:44	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW11-E

ACZ Sample ID: **L29511-07**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	35.1		*	mg/L	2	20	03/23/16 0:00	abd
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/23/16 0:00	abd
Total Alkalinity		1	35.1		*	mg/L	2	20	03/23/16 0:00	abd
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			04/01/16 0:00	calc
Sum of Anions			25			meq/L			04/01/16 0:00	calc
Sum of Cations			25			meq/L			04/01/16 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	03/21/16 13:49	abd
Chloride	SM4500Cl-E	1	87.5		*	mg/L	0.5	2	03/25/16 14:56	mss2
Conductivity @25C	SM2510B	1	2040		*	umhos/cm	1	10	03/23/16 19:24	abd
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 14:05	mss2
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/25/16 11:26	enb
Fluoride	SM4500F-C	1	1.32		*	mg/L	0.05	0.3	03/25/16 13:56	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		1060			mg/L	0.2	5	04/01/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	1.38		*	mg/L	0.02	0.1	03/25/16 23:13	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/29/16 9:46	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	03/24/16 23:28	pjb
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	03/23/16 0:00	abd
pH measured at		1	22.2		*	C	0.1	0.1	03/23/16 0:00	abd
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	04/01/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/25/16 10:41	enb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/19/16 13:17	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/29/16 14:28	spl
Residue, Filterable (TDS) @180C	SM2540C	1	1770		*	mg/L	10	20	03/22/16 11:27	sck
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/18/16 15:18	emk
Residue, Total (TS) @ 105C	SM2540B	1	1800		*	mg/L	10	20	03/22/16 10:22	sck
Sulfate	D516-02/-07 - Turbidimetric	50	1030		*	mg/L	50	250	03/28/16 12:03	mss2
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/23/16 15:32	sck
TDS (calculated)	Calculation		1650			mg/L			04/01/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.07						04/01/16 0:00	calc



Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29511**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29511-01	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400694	Mercury, dissolved	M245.1 CVAA	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG400431	Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400445	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400588	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400445	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400560	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
	WG400242	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400592	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400658	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400542	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400545	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400247	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

Tahoe Resources, Inc.

ACZ Project ID: **L29511**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG400706	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400329	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG400216	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400327	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG400627	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG400420	Sulfide as S	SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29511**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29511-02	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400694	Mercury, dissolved	M245.1 CVAA	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG400431	Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400445	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400588	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400445	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400560	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
	WG400559	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400592	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400658	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG400542	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400545	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400247	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400706	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.

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			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400329	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG400216	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400327	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG400627	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG400420	Sulfide as S	SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29511-03	WG400473	Total Hot Plate Digestion	M200.2 ICP-MS	DH	Sample required dilution due to high TDS and/or EC value.
	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400694	Mercury, dissolved	M245.1 CVAA	MA	Recovery for either the spike or spike duplicate was outside of the acceptance limits; the RPD was within the acceptance limits.
	WG400431	Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400445	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400588	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400445	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400560	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
	WG400559	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400592	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400658	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG400542	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG400445	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400545	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400247	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400706	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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					sample is too low for accurate evaluation (< 10x MDL).
WG400329		Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
WG400216		Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400327		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG400627		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
WG400420		Sulfide as S	SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	QD	Reported value is the background-corrected concentration, as described by the method.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400445		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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L29511-04	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
WG400445		Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
WG400270		Chemical Oxygen Demand	M410.4	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
			M410.4	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400588		Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
WG400445		Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
WG400462		Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400560		Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
WG400559		Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400445		Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
WG400592		Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400658		Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
WG400542		Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
WG400445		pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
			SM4500H+ B	Q6	Sample was received above recommended temperature.
WG400545		Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400247		Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400706		Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400329		Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
WG400216		Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
WG400327		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG400627		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
WG400420		Sulfide as S	SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400445		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29511-05	WG400473	Total Hot Plate Digestion	M200.2 ICP-MS	DJ	Sample dilution required due to insufficient sample.
	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400445	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
	WG400588	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400445	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400560	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
	WG400559	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400592	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400658	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG400542	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG400445	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400545	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400247	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400706	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400329	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG400216	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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					sample is too low for accurate evaluation (< 10x MDL).
WG400327		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG400627		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
WG400420		Sulfide as S	SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	QD	Reported value is the background-corrected concentration, as described by the method.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400445		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29511-06	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400445	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
	WG400588	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400445	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400560	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
	WG400559	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400592	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400658	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG400542	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG400445	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400545	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400247	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400706	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400329	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG400216	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400327	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG400627	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte

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					concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400420	Sulfide as S	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
			SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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L29511-07	WG400431	Calcium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400445	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400270	Chemical Oxygen Demand	M410.4	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M410.4	Q6	Sample was received above recommended temperature.
	WG400588	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG400445	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400581	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400560	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
	WG400559	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400445	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400592	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400658	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG400542	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG400445	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400545	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400247	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400706	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400329	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG400216	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data

Tahoe Resources, Inc.

ACZ Project ID: **L29511**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400327		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG400627		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
WG400420		Sulfide as S	SM4500S2-D	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400445		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW2A-EACZ Sample ID: **L29511-01**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**
Extract Method: **M3520****Workgroup:** WG400453Analyst: itm
Extract Date: 03/22/16 10:48
Analysis Date: 03/23/16 21:48

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	85.8		1	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW2A-EACZ Sample ID: **L29511-01**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400558

Analyst: id

Extract Date:

Analysis Date: 03/25/16 15:18

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		2.8	B	1.04	*	mg/L	2.1	10.4

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW3-EACZ Sample ID: **L29511-02**
Date Sampled: 03/16/16 11:10
Date Received: 03/18/16
Sample Matrix: Surface Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**
Extract Method: **M3520****Workgroup:** WG400453Analyst: itm
Extract Date: 03/22/16 10:50
Analysis Date: 03/23/16 22:16

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.02	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	85.2		1.02	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW3-EACZ Sample ID: **L29511-02**
Date Sampled: 03/16/16 11:10
Date Received: 03/18/16
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400558

Analyst: id

Extract Date:

Analysis Date: 03/25/16 15:35

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.05	*	mg/L	2.1	10.5

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW4A-E

ACZ Sample ID: **L29511-03**
Date Sampled: 03/16/16 11:00
Date Received: 03/18/16
Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG400453

Analyst: itm
Extract Date: 03/22/16 10:51
Analysis Date: 03/23/16 22:43

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.2	J	1.08	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	92.9		1.08	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW4A-EACZ Sample ID: **L29511-03**
Date Sampled: 03/16/16 11:00
Date Received: 03/18/16
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400558

Analyst: id

Extract Date:

Analysis Date: 03/25/16 15:52

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		4.2	B	1.08	*	mg/L	2.2	10.8

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW6-EACZ Sample ID: **L29511-04**

Date Sampled: 03/16/16 8:25

Date Received: 03/18/16

Sample Matrix: *Surface Water***Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG400453

Analyst: itm

Extract Date: 03/22/16 10:52

Analysis Date: 03/23/16 23:11

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	88		1	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW6-EACZ Sample ID: **L29511-04**
Date Sampled: 03/16/16 8:25
Date Received: 03/18/16
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400558

Analyst: id

Extract Date:

Analysis Date: 03/25/16 16:09

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.06	*	mg/L	2.1	10.6

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW8-E

ACZ Sample ID: **L29511-05**
Date Sampled: 03/16/16 10:15
Date Received: 03/18/16
Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG400453

Analyst: itm
Extract Date: 03/22/16 10:54
Analysis Date: 03/23/16 23:38

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.02	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	71.9		1.02	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW8-EACZ Sample ID: **L29511-05**
Date Sampled: 03/16/16 10:15
Date Received: 03/18/16
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400558

Analyst: id

Extract Date:

Analysis Date: 03/25/16 16:25

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		3.3	B	1.06	*	mg/L	2.1	10.6

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW9-E

ACZ Sample ID: **L29511-06**

Date Sampled: 03/16/16 9:05

Date Received: 03/18/16

Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**

Extract Method: **M3520**

Workgroup: **WG400453**

Analyst: itm

Extract Date: 03/22/16 10:55

Analysis Date: 03/24/16 0:06

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	84.2		1	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW9-EACZ Sample ID: **L29511-06**

Date Sampled: 03/16/16 9:05

Date Received: 03/18/16

Sample Matrix: Surface Water

Oil & Grease, Total RecoverableAnalysis Method: **1664A - Gravimetric**

Extract Method:

Workgroup: WG400669

Analyst: id

Extract Date:

Analysis Date: 03/29/16 9:20

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.1	*	mg/L	2.2	11

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SW11-E

ACZ Sample ID: **L29511-07**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: Surface Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG400453

Analyst: itm
Extract Date: 03/22/16 10:57
Analysis Date: 03/24/16 0:34

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.03	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	81.9		1.03	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SW11-EACZ Sample ID: **L29511-07**
Date Sampled: 03/16/16 11:35
Date Received: 03/18/16
Sample Matrix: *Surface Water***Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**
Extract Method:**Workgroup:** WG400669

Analyst: id

Extract Date:

Analysis Date: 03/29/16 9:40

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		2.7	B	1.06	*	mg/L	2.1	10.6

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>LCL</i>	Lower Control Limit
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #4) Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>UCL</i>	Upper Control Limit
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>SURR</i>	Surrogate	<i>LFM</i>	Laboratory Fortified Matrix
<i>INTS</i>	Internal Standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBS</i>	Prep Blank - Soil
<i>LFB</i>	Laboratory Fortified Blank	<i>PBW</i>	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
O	Analyte concentration is estimated due to result exceeding calibration range.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
J	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
- (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Excluding Oil & Grease, solid & biological matrices for organic analyses are reported on a wet weight basis.
- (3) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (4) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

ACZ Project ID: **L29511**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29511-01	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400558	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L29511-02	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400558	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L29511-03	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400558	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L29511-04	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400558	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L29511-05	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400558	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L29511-06	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400669	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L29511-07	WG400453	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG400669	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29511**

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bismuth, dissolved	M200.7 ICP
Bismuth, total	M200.7 ICP
Gallium, dissolved	M200.7 ICP
Gallium, total	M200.7 ICP
Scandium, dissolved	M200.7 ICP
Scandium, total	M200.7 ICP

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29511
 Date Received: 03/18/2016 10:00
 Received By: ddp
 Date Printed: 3/18/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?		X	

Some parameters were received past hold time.

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
3076	9.2	<=6.0	13	N/A
3687	11.3	<=6.0	14	N/A
4453	8.2	<=6.0	13	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29511
Date Received: 03/18/2016 10:00
Received By: ddp
Date Printed: 3/18/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc. *L29511*

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: <i>Miguel Berganza</i>	Address: <i>Bulevar 105 Práceres 18 calle 24-69 zona 10</i>
Company: <i>Tahoe Resources INC</i>	Empresarial zona Pradera Torre IV oficina 1406
E-mail: <i>M.Berganza @sanrafael.com.gt</i>	Telephone: <i>(502) 5951 5248</i>

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: <i>Miguel Berganza</i>	Address:
Company: <i>Tahoe Resources INC</i>	
E-mail: <i>M.Berganza @sanrafael.com.gt</i>	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: *LF* Sampler's Site Information State _____ Zip code _____ Time Zone _____

*Sampler's Signature: *[Signature]* *I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: <i>Water Quality</i>	# of Containers <i>3</i>																			
PO#: <i>Escobal</i>																				
Reporting state for compliance testing:																				
Check box if samples include NRC licensed material? <input type="checkbox"/>																				
SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers																	
<i>SW6-E</i>	<i>16/02/16 08:25</i>	<i>SW</i>	<i>10</i>	<input checked="" type="checkbox"/>																
<i>SW8-E</i>	<i>16/03/16 10:15</i>	<i>SW</i>	<i>10</i>	<input checked="" type="checkbox"/>																
<i>SW9-E</i>	<i>16/03/16 09:05</i>	<i>SW</i>	<i>10</i>	<input checked="" type="checkbox"/>																

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

COC # 2/3

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
<i>[Signature]</i>	<i>16-03-2016 15:40</i>	<i>[Signature]</i>	<i>16.3.16 15:40</i>
		<i>[Signature]</i>	<i>16/03/16 10:00</i>



Laboratories, Inc.

629511

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza
Company: Tabor Resources Inc
E-mail: M.Berganza@montana.com.gt

Address: Bv. Los Pinos 18 Calle Cu-69 Zona 10
Empresarial zona Pradera Torre IV oficina 1706
Telephone: (502) 9951 5248

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tabor Resources Inc
E-mail: M.Berganza@montana.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality
PO#: Escobal
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

Table with columns for # of Containers and analysis results. Contains handwritten 'NO' in the # of Containers column.

7. R

Table with columns: SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers. Rows include SW11-E, WW12, SW13.

COPY

Matrix SW (Surface Water) - GW (Ground Water) - WW (Waste Water) - DW (Drinking Water) - SL (Sludge) - SO (Soil) - OL (Oil) - Other (Specify)

REMARKS

coc # 2/3 report results of all samples in coc # 1, all samples in coc # 2, and only SW11-E in coc # 3 in the same document.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

Table with columns: RELINQUISHED BY, DATE:TIME, RECEIVED BY, DATE:TIME. Includes handwritten signatures and dates.



Guatemala March 16th 2016

To whom it may concern:

Minera San Rafael, S.A is sending a case with samples of water, which is not contaminated, that are going to be analyzed by the ACZ Laboratories in Steamboat Springs, Colorado, USA.

If you have any question or doubt, please contact Miguel Berganza at Minera San Rafael, S.A. (502 - 5951-5248) or Sue Webber at ACZ Laboratories (970-879-6590).

Sincerely yours,

Miguel Berganza
Environment Department.
Mina El Escobal
Minera San Rafael, S.A.

REG 016 Resultados de Análisis

Muestra: 5 muestras de agua
Análisis solicitado por: Ing. Miguel Berganza
Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa
Procedencia de la muestra: Proyecto Escobal
Fecha de muestreo: 140316
Fecha de ingreso de muestras: 140316
Fecha de análisis: 140316-280316
Fecha de informe: 280316

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	Demanda Bioquímica de Oxígeno DBO ₅ mg/l	* Demanda Química de Oxígeno DQO mg/l	Cromo Hexavalente Cr(VI) mg/l	** Coliformes Fecales (NMP/100ml)
4132	SW1-E	< 1	< 1	< 10	< 25	N.D.	49
4133	SW2-E	< 1	< 1	< 10	< 25	N.D.	540
4134	SW4-E	44	< 1	< 10	< 25	N.D.	4.9 x 10 ⁴
4135	SW5-E	< 1	< 1	< 10	< 25	N.D.	1.6 x 10 ⁴
4136	SW10-E	< 1	< 1	< 10	< 25	N.D.	< 2

Notas:

Captación de muestras: Las muestras fueron captadas por personal ajeno a Ecosistemas Proyectos Ambientales.

Transporte y preservación de la muestra: Refrigeración.

Metodología: Espectrofotométricos / SMWW: Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977.

Fotométricos Merck. NMP: Número más Probable.

N.D. No detectable. Debajo del límite de detección.

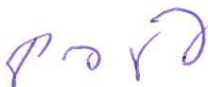
Límites de detección: Cromo hexavalente (0.05 mg/l)

Los resultados obtenidos corresponden únicamente a las muestras recibidas por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

* Análisis acreditado COGUANOR NGR/COPANT/ISO/IEC 17025 según OGA LE 006-04

** Análisis referido.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

REG 016 Resultados de Análisis

Muestra: 7 muestras de agua
Análisis solicitado por: Ing. Miguel Berganza
Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa
Procedencia de la muestra: Proyecto Escobal
Fecha de muestreo: 160316
Fecha de ingreso de muestras: 160316
Fecha de análisis: 160316-300316
Fecha de informe: 300316

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	Demanda Bioquímica de Oxígeno DBO ₅ mg/l	* Demanda Química de Oxígeno DQO mg/l	Cromo Hexavalente Cr(VI) mg/l	** Coliformes Fecales (NMP/100ml)
4154	SW2A-E	< 1	< 1	< 10	< 25	N.D.	220
4155	SW3-E	< 1	< 1	< 10	< 25	N.D.	49
4156	SW4A-E	107	< 1	17	40	N.D.	2.4 x 10 ⁴
4157	SW6-E	< 1	< 1	< 10	< 25	N.D.	1.7 x 10 ³
4158	SW8-E	20	< 1	< 10	< 25	N.D.	2.4 x 10 ⁴
4159	SW9-E	< 1	< 1	< 10	< 25	N.D.	2.4 x 10 ³
4160	SW11-E	< 1	< 1	< 10	< 25	N.D.	700

Notas:

Captación de muestras: Las muestras fueron captadas por personal ajeno a Ecosistemas Proyectos Ambientales.

Transporte y preservación de la muestra: Refrigeración.

Metodología: Espectrofotométricos / SMWW: Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977.

Fotométricos Merck. NMP: Número más Probable.

N.D. No detectable. Debajo del límite de detección.

Límites de detección: Cromo hexavalente (0.05 mg/l)

Los resultados obtenidos corresponden únicamente a las muestras recibidas por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

* Análisis acreditado COGUANOR NGR/COPANT/ISO/IEC 17025 según OGA LE 006-04

** Análisis referido.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

11.5.2 Muestras de Agua Subterránea (GW) pozos de monitoreo y suministro

March 14, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29217

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 03, 2016. This project has been assigned to ACZ's project number, L29217. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29217. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

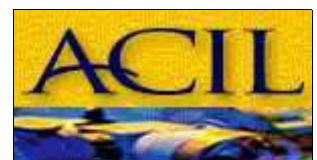
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 13, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

March 14, 2016

Project ID: Escobal

ACZ Project ID: L29217

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 6 ground water samples from Tahoe Resources, Inc. on March 3, 2016. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L29217. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for parameters flagged with "H" flags (H3, HE), received either after the hold time expired or too close to the hold time.

Sample Analysis

These samples were analyzed for inorganic, organic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. For samples with a TDS ratio over 1.2 and a TDS value greater than 150 mg/L, the samples were not retested based on historical re-analysis data and the sample matrix.

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: GW-2

ACZ Sample ID: **L29217-01**
Date Sampled: 03/01/16 08:15
Date Received: 03/03/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 13:45	spl
Cyanide, WAD	SM4500-CN I- distillation								03/10/16 11:32	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 11:59	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 17:04	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 12:23	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.25			mg/L	0.03	0.2	03/07/16 14:06	gss
Antimony, dissolved	M200.8 ICP-MS	1	0.0009	B		mg/L	0.0004	0.002	03/09/16 21:47	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0058			mg/L	0.0002	0.001	03/09/16 21:47	mfm
Barium, dissolved	M200.7 ICP	1	0.107			mg/L	0.003	0.02	03/07/16 14:06	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:06	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/07/16 14:06	gss
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:06	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 21:47	mfm
Calcium, dissolved	M200.7 ICP	1	15.3			mg/L	0.1	0.5	03/07/16 14:06	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:06	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:06	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:06	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:06	gss
Iron, dissolved	M200.7 ICP	1	0.18			mg/L	0.02	0.05	03/07/16 14:06	gss
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	03/09/16 21:47	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:06	gss
Magnesium, dissolved	M200.7 ICP	1	2.8			mg/L	0.2	1	03/07/16 14:06	gss
Manganese, dissolved	M200.7 ICP	1	0.034			mg/L	0.005	0.03	03/07/16 14:06	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:04	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/07/16 14:06	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:06	gss
Potassium, dissolved	M200.7 ICP	1	2.2			mg/L	0.2	1	03/07/16 14:06	gss
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:06	gss
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	03/09/16 21:47	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/09/16 21:47	mfm
Sodium, dissolved	M200.7 ICP	1	7.5			mg/L	0.2	1	03/07/16 14:06	gss
Strontium, dissolved	M200.7 ICP	1	0.123			mg/L	0.005	0.03	03/07/16 14:06	gss
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 21:47	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/07/16 14:06	gss
Titanium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	03/07/16 14:06	gss
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 21:47	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:06	gss
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:06	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: GW-2

ACZ Sample ID: **L29217-01**
 Date Sampled: 03/01/16 08:15
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	47.0		*	mg/L	2	20	03/03/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Total Alkalinity		1	47.0		*	mg/L	2	20	03/03/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			3.7			%			03/14/16 0:00	calc
Sum of Anions			1.3			meq/L			03/14/16 0:00	calc
Sum of Cations			1.4			meq/L			03/14/16 0:00	calc
Chloride	SM4500Cl-E	1	4.6		*	mg/L	0.5	2	03/09/16 9:21	spl
Conductivity @25C	SM2510B	1	155		*	umhos/cm	1	10	03/03/16 17:26	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/12/16 15:01	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/10/16 14:55	enb
Fluoride	SM4500F-C	1	0.17	B	*	mg/L	0.05	0.3	03/08/16 16:57	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		50			mg/L	0.2	5	03/14/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.54		*	mg/L	0.02	0.1	03/11/16 21:15	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.06	B	*	mg/L	0.05	0.2	03/08/16 10:37	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.3	B	*	mg/L	0.1	0.5	03/08/16 23:24	pjb
pH (lab)	SM4500H+ B									
pH		1	7.4	H	*	units	0.1	0.1	03/03/16 0:00	sck
pH measured at		1	22.1		*	C	0.1	0.1	03/03/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.19	B		mg/L	0.06	0.2	03/14/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	03/08/16 19:13	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	03/03/16 19:40	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.07		*	mg/L	0.02	0.05	03/08/16 18:03	mss2
Residue, Filterable (TDS) @180C	SM2540C	1	138		*	mg/L	10	20	03/03/16 13:45	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:11	emk
Residue, Total (TS) @ 105C	SM2540B	1	136		*	mg/L	10	20	03/03/16 13:39	emk
Sulfate	D516-02/-07 - Turbidimetric	1	12.7		*	mg/L	1	5	03/08/16 12:51	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/03/16 14:16	sck
TDS (calculated)	Calculation		74.6			mg/L			03/14/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.85						03/14/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: GW-3

ACZ Sample ID: **L29217-02**
 Date Sampled: 03/01/16 11:15
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 14:01	spl
Cyanide, WAD	SM4500-CN I- distillation								03/10/16 11:55	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 12:13	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 17:13	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 12:26	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/07/16 14:09	gss
Antimony, dissolved	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	03/09/16 21:55	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0018			mg/L	0.0002	0.001	03/09/16 21:55	mfm
Barium, dissolved	M200.7 ICP	1	0.089			mg/L	0.003	0.02	03/07/16 14:09	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:09	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/07/16 14:09	gss
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	03/07/16 14:09	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 21:55	mfm
Calcium, dissolved	M200.7 ICP	1	55.9			mg/L	0.1	0.5	03/07/16 14:09	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:09	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:09	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:09	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:09	gss
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/07/16 14:09	gss
Lead, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	03/09/16 21:55	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:09	gss
Magnesium, dissolved	M200.7 ICP	1	12.5			mg/L	0.2	1	03/07/16 14:09	gss
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:09	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:06	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/07/16 14:09	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:09	gss
Potassium, dissolved	M200.7 ICP	1	7.5			mg/L	0.2	1	03/07/16 14:09	gss
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:09	gss
Selenium, dissolved	M200.8 ICP-MS	1	0.0004			mg/L	0.0001	0.0003	03/09/16 21:55	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/09/16 21:55	mfm
Sodium, dissolved	M200.7 ICP	1	19.2			mg/L	0.2	1	03/07/16 14:09	gss
Strontium, dissolved	M200.7 ICP	1	0.295			mg/L	0.005	0.03	03/07/16 14:09	gss
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 21:55	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/07/16 14:09	gss
Titanium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	03/07/16 14:09	gss
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 21:55	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:09	gss
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:09	gss

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: GW-3

ACZ Sample ID: **L29217-02**
Date Sampled: 03/01/16 11:15
Date Received: 03/03/16
Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	69.5		*	mg/L	2	20	03/03/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Total Alkalinity		1	69.5		*	mg/L	2	20	03/03/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-1.0			%			03/14/16 0:00	calc
Sum of Anions			5			meq/L			03/14/16 0:00	calc
Sum of Cations			4.9			meq/L			03/14/16 0:00	calc
Chloride	SM4500Cl-E	1	11.9		*	mg/L	0.5	2	03/09/16 9:21	spl
Conductivity @25C	SM2510B	1	537		*	umhos/cm	1	10	03/03/16 17:34	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/12/16 15:03	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/10/16 14:57	enb
Fluoride	SM4500F-C	1	0.19	B	*	mg/L	0.05	0.3	03/08/16 17:01	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		191			mg/L	0.2	5	03/14/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.87		*	mg/L	0.02	0.1	03/11/16 21:16	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 10:38	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/08/16 23:25	pjb
pH (lab)	SM4500H+ B									
pH		1	7.5	H	*	units	0.1	0.1	03/03/16 0:00	sck
pH measured at		1	22.1		*	C	0.1	0.1	03/03/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	03/14/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	03/08/16 19:15	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	03/03/16 19:42	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/08/16 18:04	mss2
Residue, Filterable (TDS) @180C	SM2540C	1	414		*	mg/L	10	20	03/03/16 13:50	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:13	emk
Residue, Total (TS) @ 105C	SM2540B	1	422		*	mg/L	10	20	03/03/16 13:45	emk
Sulfate	D516-02/-07 - Turbidimetric	5	155		*	mg/L	5	25	03/08/16 12:57	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/03/16 14:21	sck
TDS (calculated)	Calculation		305			mg/L			03/14/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.36						03/14/16 0:00	calc

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: GW-11ACZ Sample ID: **L29217-03**

Date Sampled: 03/01/16 11:15

Date Received: 03/03/16

Sample Matrix: *Ground Water*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 14:16	spl
Cyanide, WAD	SM4500-CN I- distillation								03/10/16 12:06	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 12:40	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 17:23	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 12:29	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/07/16 14:18	gss
Antimony, dissolved	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0004	0.002	03/09/16 22:04	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0021			mg/L	0.0002	0.001	03/09/16 22:04	mfm
Barium, dissolved	M200.7 ICP	1	0.091			mg/L	0.003	0.02	03/07/16 14:18	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:18	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/07/16 14:18	gss
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	03/07/16 14:18	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:04	mfm
Calcium, dissolved	M200.7 ICP	1	57.5			mg/L	0.1	0.5	03/07/16 14:18	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:18	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:18	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:18	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:18	gss
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/07/16 14:18	gss
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:04	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:18	gss
Magnesium, dissolved	M200.7 ICP	1	12.8			mg/L	0.2	1	03/07/16 14:18	gss
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:18	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:08	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/07/16 14:18	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:18	gss
Potassium, dissolved	M200.7 ICP	1	7.6			mg/L	0.2	1	03/07/16 14:18	gss
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:18	gss
Selenium, dissolved	M200.8 ICP-MS	1	0.0004			mg/L	0.0001	0.0003	03/09/16 22:04	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/09/16 22:04	mfm
Sodium, dissolved	M200.7 ICP	1	19.5			mg/L	0.2	1	03/07/16 14:18	gss
Strontium, dissolved	M200.7 ICP	1	0.300			mg/L	0.005	0.03	03/07/16 14:18	gss
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:04	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/07/16 14:18	gss
Titanium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	03/07/16 14:18	gss
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:04	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:18	gss
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:18	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: GW-11

ACZ Sample ID: **L29217-03**
 Date Sampled: 03/01/16 11:15
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	76.3		*	mg/L	2	20	03/03/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Total Alkalinity		1	76.3		*	mg/L	2	20	03/03/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-1.0			%			03/14/16 0:00	calc
Sum of Anions			5.1			meq/L			03/14/16 0:00	calc
Sum of Cations			5			meq/L			03/14/16 0:00	calc
Chloride	SM4500Cl-E	1	11.6		*	mg/L	0.5	2	03/09/16 9:21	spl
Conductivity @25C	SM2510B	1	540		*	umhos/cm	1	10	03/03/16 17:43	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/12/16 15:05	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/10/16 14:58	enb
Fluoride	SM4500F-C	1	0.19	B	*	mg/L	0.05	0.3	03/08/16 17:05	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		196			mg/L	0.2	5	03/14/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.89		*	mg/L	0.02	0.1	03/11/16 21:17	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 10:40	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.1	B	*	mg/L	0.1	0.5	03/08/16 23:28	pjb
pH (lab)	SM4500H+ B									
pH		1	7.5	H	*	units	0.1	0.1	03/03/16 0:00	sck
pH measured at		1	22.2		*	C	0.1	0.1	03/03/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	03/14/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	03/08/16 19:16	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	03/03/16 19:45	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	03/08/16 18:05	mss2
Residue, Filterable (TDS) @180C	SM2540C	1	410		*	mg/L	10	20	03/03/16 13:55	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:16	emk
Residue, Total (TS) @105C	SM2540B	1	422		*	mg/L	10	20	03/03/16 13:51	emk
Sulfate	D516-02/-07 - Turbidimetric	5	155		*	mg/L	5	25	03/08/16 12:57	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/03/16 14:26	sck
TDS (calculated)	Calculation		311			mg/L			03/14/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.32						03/14/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-11

ACZ Sample ID: **L29217-04**
Date Sampled: 03/01/16 10:40
Date Received: 03/03/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 14:24	spl
Cyanide, WAD	SM4500-CN I- distillation								03/10/16 12:18	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 13:08	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 17:32	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 12:36	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.05	B		mg/L	0.03	0.2	03/07/16 14:21	gss
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/09/16 22:07	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0031			mg/L	0.0002	0.001	03/09/16 22:07	mfm
Barium, dissolved	M200.7 ICP	1	0.025			mg/L	0.003	0.02	03/07/16 14:21	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:21	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/07/16 14:21	gss
Boron, dissolved	M200.7 ICP	1	0.19			mg/L	0.01	0.05	03/07/16 14:21	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:07	mfm
Calcium, dissolved	M200.7 ICP	1	247			mg/L	0.1	0.5	03/07/16 14:21	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:21	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:21	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:21	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:21	gss
Iron, dissolved	M200.7 ICP	1	1.28			mg/L	0.02	0.05	03/07/16 14:21	gss
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:07	mfm
Lithium, dissolved	M200.7 ICP	1	0.079			mg/L	0.008	0.04	03/07/16 14:21	gss
Magnesium, dissolved	M200.7 ICP	1	35.9			mg/L	0.2	1	03/07/16 14:21	gss
Manganese, dissolved	M200.7 ICP	1	0.023	B		mg/L	0.005	0.03	03/07/16 14:21	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:10	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/07/16 14:21	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:21	gss
Potassium, dissolved	M200.7 ICP	1	4.5			mg/L	0.2	1	03/07/16 14:21	gss
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:21	gss
Selenium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0003	03/09/16 22:07	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/09/16 22:07	mfm
Sodium, dissolved	M200.7 ICP	1	68.5			mg/L	0.2	1	03/07/16 14:21	gss
Strontium, dissolved	M200.7 ICP	1	2.310			mg/L	0.005	0.03	03/07/16 14:21	gss
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:07	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/07/16 14:21	gss
Titanium, dissolved	M200.7 ICP	1	0.013	B		mg/L	0.005	0.03	03/07/16 14:21	gss
Uranium, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	03/09/16 22:07	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:21	gss
Zinc, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	03/07/16 14:21	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-11

ACZ Sample ID: **L29217-04**
 Date Sampled: 03/01/16 10:40
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	134		*	mg/L	2	20	03/03/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Total Alkalinity		1	134		*	mg/L	2	20	03/03/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			03/14/16 0:00	calc
Sum of Anions			19			meq/L			03/14/16 0:00	calc
Sum of Cations			19			meq/L			03/14/16 0:00	calc
Chloride	SM4500Cl-E	1	62.2		*	mg/L	0.5	2	03/09/16 9:22	spl
Conductivity @25C	SM2510B	1	1750		*	umhos/cm	1	10	03/03/16 17:52	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/12/16 15:05	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/10/16 15:13	enb
Fluoride	SM4500F-C	1	2.58		*	mg/L	0.05	0.3	03/08/16 17:09	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		765			mg/L	0.2	5	03/14/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/11/16 21:23	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 10:42	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/08/16 23:30	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	03/03/16 0:00	sck
pH measured at		1	21.9		*	C	0.1	0.1	03/03/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/14/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/08/16 19:19	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/03/16 19:46	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/08/16 18:07	mss2
Residue, Filterable (TDS) @180C	SM2540C	1	1360		*	mg/L	10	20	03/03/16 14:00	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:19	emk
Residue, Total (TS) @ 105C	SM2540B	1	1400		*	mg/L	10	20	03/03/16 13:57	emk
Sulfate	D516-02/-07 - Turbidimetric	20	685		*	mg/L	20	100	03/08/16 13:08	spl
Sulfide as S	SM4500S2-D	1	0.06	B	*	mg/L	0.02	0.1	03/03/16 14:32	sck
TDS (calculated)	Calculation		1190			mg/L			03/14/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.14						03/14/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: RW-1

ACZ Sample ID: **L29217-05**
Date Sampled: 03/01/16 09:24
Date Received: 03/03/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 14:32	spl
Cyanide, WAD	SM4500-CN I- distillation		-						03/10/16 12:29	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 13:22	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 17:41	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 12:42	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/07/16 14:24	gss
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/09/16 22:10	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0006	B		mg/L	0.0002	0.001	03/09/16 22:10	mfm
Barium, dissolved	M200.7 ICP	1	0.089			mg/L	0.003	0.02	03/07/16 14:24	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:24	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/07/16 14:24	gss
Boron, dissolved	M200.7 ICP	1	0.12			mg/L	0.01	0.05	03/07/16 14:24	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:10	mfm
Calcium, dissolved	M200.7 ICP	1	218			mg/L	0.1	0.5	03/07/16 14:24	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:24	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:24	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:24	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:24	gss
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/07/16 14:24	gss
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:10	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:24	gss
Magnesium, dissolved	M200.7 ICP	1	33.7			mg/L	0.2	1	03/07/16 14:24	gss
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:24	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:12	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/07/16 14:24	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:24	gss
Potassium, dissolved	M200.7 ICP	1	10.8			mg/L	0.2	1	03/07/16 14:24	gss
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:24	gss
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	03/09/16 22:10	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/09/16 22:10	mfm
Sodium, dissolved	M200.7 ICP	1	55.3			mg/L	0.2	1	03/07/16 14:24	gss
Strontium, dissolved	M200.7 ICP	1	1.700			mg/L	0.005	0.03	03/07/16 14:24	gss
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:10	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/07/16 14:24	gss
Titanium, dissolved	M200.7 ICP	1	0.012	B		mg/L	0.005	0.03	03/07/16 14:24	gss
Uranium, dissolved	M200.8 ICP-MS	1	0.0040			mg/L	0.0001	0.0005	03/09/16 22:10	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:24	gss
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:24	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: RW-1

ACZ Sample ID: **L29217-05**
 Date Sampled: 03/01/16 09:24
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	129		*	mg/L	2	20	03/03/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Total Alkalinity		1	129		*	mg/L	2	20	03/03/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-3.0			%			03/14/16 0:00	calc
Sum of Anions			17			meq/L			03/14/16 0:00	calc
Sum of Cations			16			meq/L			03/14/16 0:00	calc
Chloride	SM4500Cl-E	1	52.5		*	mg/L	0.5	2	03/09/16 9:22	spl
Conductivity @25C	SM2510B	1	1450		*	umhos/cm	1	10	03/03/16 18:01	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/12/16 15:06	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/10/16 15:13	enb
Fluoride	SM4500F-C	1	1.64		*	mg/L	0.05	0.3	03/08/16 17:12	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		683			mg/L	0.2	5	03/14/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.29		*	mg/L	0.02	0.1	03/11/16 21:24	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 10:45	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	03/08/16 23:31	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	03/03/16 0:00	sck
pH measured at		1	22.3		*	C	0.1	0.1	03/03/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	03/14/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	03/08/16 19:20	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.06	H	*	mg/L	0.02	0.05	03/03/16 19:47	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/08/16 18:10	mss2
Residue, Filterable (TDS) @180C	SM2540C	1	1090		*	mg/L	10	20	03/03/16 14:05	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	8.0	B	*	mg/L	5	20	03/04/16 12:21	emk
Residue, Total (TS) @ 105C	SM2540B	1	1130		*	mg/L	10	20	03/03/16 14:03	emk
Sulfate	D516-02/-07 - Turbidimetric	20	588		*	mg/L	20	100	03/08/16 13:08	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/03/16 14:37	sck
TDS (calculated)	Calculation		1040			mg/L			03/14/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.05						03/14/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: GW-10

ACZ Sample ID: **L29217-06**
 Date Sampled: 03/01/16 12:00
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 14:40	spl
Cyanide, WAD	SM4500-CN I- distillation								03/10/16 12:40	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 13:36	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 17:50	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 12:45	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/07/16 14:27	gss
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/09/16 22:14	mfm
Arsenic, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	03/09/16 22:14	mfm
Barium, dissolved	M200.7 ICP	1		U		mg/L	0.003	0.02	03/07/16 14:27	gss
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:27	gss
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/07/16 14:27	gss
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:27	gss
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:14	mfm
Calcium, dissolved	M200.7 ICP	1	0.1	B		mg/L	0.1	0.5	03/07/16 14:27	gss
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:27	gss
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:27	gss
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:27	gss
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:27	gss
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/07/16 14:27	gss
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:14	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:27	gss
Magnesium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/07/16 14:27	gss
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:27	gss
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:14	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/07/16 14:27	gss
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/07/16 14:27	gss
Potassium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/07/16 14:27	gss
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/07/16 14:27	gss
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	03/09/16 22:14	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/09/16 22:14	mfm
Sodium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/07/16 14:27	gss
Strontium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:27	gss
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:14	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/07/16 14:27	gss
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:27	gss
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/09/16 22:14	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/07/16 14:27	gss
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/07/16 14:27	gss

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: GW-10

ACZ Sample ID: **L29217-06**
 Date Sampled: 03/01/16 12:00
 Date Received: 03/03/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Total Alkalinity		1		U	*	mg/L	2	20	03/03/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			n/a			%			03/14/16 0:00	calc
Sum of Anions				U		meq/L			03/14/16 0:00	calc
Sum of Cations				U		meq/L			03/14/16 0:00	calc
Chloride	SM4500Cl-E	1		U	*	mg/L	0.5	2	03/09/16 9:22	spl
Conductivity @25C	SM2510B	1	2.1	B	*	umhos/cm	1	10	03/03/16 18:08	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/12/16 15:09	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/10/16 15:14	enb
Fluoride	SM4500F-C	1		U	*	mg/L	0.05	0.3	03/08/16 17:17	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		0.3	B		mg/L	0.2	5	03/14/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/11/16 21:25	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.13	B	*	mg/L	0.05	0.2	03/08/16 10:47	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/09/16 0:11	pjb
pH (lab)	SM4500H+ B									
pH		1	6.2	H	*	units	0.1	0.1	03/03/16 0:00	sck
pH measured at		1	22.2		*	C	0.1	0.1	03/03/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/14/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/08/16 19:21	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/03/16 19:48	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/08/16 18:11	mss2
Residue, Filterable (TDS) @180C	SM2540C	1		U	*	mg/L	10	20	03/03/16 14:10	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:24	emk
Residue, Total (TS) @ 105C	SM2540B	1		U	*	mg/L	10	20	03/03/16 14:09	emk
Sulfate	D516-02/-07 - Turbidimetric	1	1.1	B	*	mg/L	1	5	03/08/16 12:51	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/03/16 14:43	sck
TDS (calculated)	Calculation		1.33			mg/L			03/14/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		n/a						03/14/16 0:00	calc

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29217**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-01	WG399518	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399518	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399896	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399821	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399654	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399518	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399522	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399508	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399509	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399658	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the

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					associated control sample (LCS or LFB) was acceptable.
	WG399510	Sulfide as S	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-02	WG399518	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399518	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399896	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399821	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399654	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399518	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399522	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399508	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399509	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399658	Sulfate	D516-02/-07 - Turbidimetric	M2	sample is too low for accurate evaluation (< 10x MDL). Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399510	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-03	WG399518	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399518	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399896	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399821	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399654	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399518	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399522	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399508	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399509	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399658	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399510	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-04	WG399518	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399518	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399896	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399821	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399654	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399518	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399522	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399508	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399509	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399658	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399510	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-05	WG399518	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399518	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399896	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399821	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399654	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399518	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399522	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399508	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399509	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data

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					validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399658	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399510	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-06	WG399518	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399518	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399896	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399821	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399654	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399518	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399522	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399508	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
			SM2540C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29217**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399509	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399658	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399510	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399518	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: GW-2

ACZ Sample ID: **L29217-01**
Date Sampled: 03/01/16 8:15
Date Received: 03/03/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399716

Analyst: mmn
Extract Date: 03/07/16 13:12
Analysis Date: 03/08/16 20:31

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	88.3		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: GW-3

ACZ Sample ID: **L29217-02**
Date Sampled: 03/01/16 11:15
Date Received: 03/03/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399716

Analyst: mmn
Extract Date: 03/07/16 13:15
Analysis Date: 03/08/16 20:58

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	84		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: GW-11

ACZ Sample ID: **L29217-03**
Date Sampled: 03/01/16 11:15
Date Received: 03/03/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399716

Analyst: mmn
Extract Date: 03/07/16 13:17
Analysis Date: 03/08/16 21:26

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	86.9		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-11

ACZ Sample ID: **L29217-04**
Date Sampled: 03/01/16 10:40
Date Received: 03/03/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399716

Analyst: mmn
Extract Date: 03/07/16 13:20
Analysis Date: 03/08/16 21:54

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.03	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	86.7		1.03	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: RW-1

ACZ Sample ID: **L29217-05**
Date Sampled: 03/01/16 9:24
Date Received: 03/03/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399716

Analyst: mmn
Extract Date: 03/07/16 13:22
Analysis Date: 03/08/16 22:49

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	90.5		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: GW-10

ACZ Sample ID: **L29217-06**
Date Sampled: 03/01/16 12:00
Date Received: 03/03/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399716

Analyst: mmn
Extract Date: 03/07/16 13:25
Analysis Date: 03/08/16 23:17

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	116.6		1	*	%	70	130

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>LCL</i>	Lower Control Limit
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #4) Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>UCL</i>	Upper Control Limit
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>SURR</i>	Surrogate	<i>LFM</i>	Laboratory Fortified Matrix
<i>INTS</i>	Internal Standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBS</i>	Prep Blank - Soil
<i>LFB</i>	Laboratory Fortified Blank	<i>PBW</i>	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
O	Analyte concentration is estimated due to result exceeding calibration range.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
J	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
- (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Excluding Oil & Grease, solid & biological matrices for organic analyses are reported on a wet weight basis.
- (3) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (4) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

ACZ Project ID: **L29217**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29217-01	WG399716	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29217-02	WG399716	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29217-03	WG399716	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29217-04	WG399716	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29217-05	WG399716	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29217-06	WG399716	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.

Tahoe Resources, Inc.

ACZ Project ID: **L29217**

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bismuth, dissolved	M200.7 ICP
Gallium, dissolved	M200.7 ICP
Scandium, dissolved	M200.7 ICP

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Sulfide as S	SM4500S2-D
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Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29217
 Date Received: 03/03/2016 09:33
 Received By: ddp
 Date Printed: 3/3/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?		X	
L29217-01 : A Orange container not received and the associated analysis could not be run.			
L29217-02 : A Orange container not received and the associated analysis could not be run.			
L29217-03 : A Orange container not received and the associated analysis could not be run.			
L29217-04 : A Orange container not received and the associated analysis could not be run.			
L29217-05 : A Orange container not received and the associated analysis could not be run.			
L29217-06 : A Orange container not received and the associated analysis could not be run.			
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?		X	
Some parameters were received past hold time.			

Chain of Custody Related Remarks

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29217
 Date Received: 03/03/2016 09:33
 Received By: ddp
 Date Printed: 3/3/2016

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
2392	14	<=6.0	11	N/A
4414	9.6	<=6.0	13	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

679217

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza
Company: Tahoe Resources Inc.
E-mail: MBerganza@sanrafael.com.gt

Address: Boulevard Los Príncipes 18 calle 24-69 zona 10
Empresarial Zona Pradera Torre IV Oficina 1406
Telephone: (502) 5951-5248

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tahoe Resources Inc.
E-mail: MBerganza@sanrafael.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses?

YES []
NO []

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring?

Yes [] No []

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: [Signature]

I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality
PO#: Escobal
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

Table with columns for Matrix, # of Containers, and various analysis results. Includes handwritten entries for GW-2, GW-3, and GW-11.

Table with columns for SAMPLE IDENTIFICATION, DATE:TIME, and Matrix. Includes handwritten entries for GW-2, GW-3, and GW-11.

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

COC 1/2

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:

DATE:TIME

RECEIVED BY:

DATE:TIME

Handwritten signatures and dates for relinquished and received parties.





Laboratories, Inc. 629217

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza	Address: Boulevard Los Próceros 18 Calle 24-69 zona 10
Company: Tahoe Resources Inc.	Em Presarial Zona Pradera Torre IV oficina 1406
E-mail: MBerganza@sanrafael.com.gt	Telephone: (502) 591-5248

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: Miguel Berganza	Address:
Company: Tahoe Resources Inc.	
E-mail: MBerganza@sanrafael.com.gt	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: [Signature] I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality	# of Containers	GW + TPH																				
PO#: Escobal																						
Reporting state for compliance testing:																						
Check box if samples include NRC licensed material?																						
SAMPLE IDENTIFICATION	DATE:TIME	Matrix	#																			
MW-11	01/03/16 10:40	GW	8	/																		
RW-1	01/03/16 09:24	GW	8	/																		
GW-10	01/03/16 12:00	GW	8	/																		

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

COC 2/2 please report results of both COC in the same report

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[Signature]	01-03-2016 14:50	[Signature]	1.3.16 14:50
		[Signature]	3-3-16 09:32



Guatemala March 1st 2016

To whom it may concern:

Minera San Rafael, S.A is sending a case with samples of water, which is not contaminated, that are going to be analyzed by the ACZ Laboratories in Steamboat Springs, Colorado, USA.

If you have any question or doubt, please contact Miguel Berganza at Minera San Rafael, S.A. (502 - 5951-5248) or Sue Webber at ACZ Laboratories (970-879-6590).

Sincerely yours,

Miguel Berganza
Environment Department.
Mina El Escobal
Minera San Rafael, S.A.

March 18, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29242

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 04, 2016. This project has been assigned to ACZ's project number, L29242. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29242. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

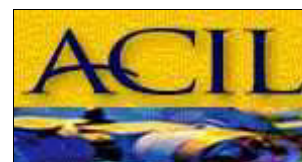
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 17, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

March 18, 2016

Project ID: Escobal

ACZ Project ID: L29242

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 10 ground water samples from Tahoe Resources, Inc. on March 4, 2016. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L29242. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for parameters flagged with "H" flags (H3, HE, C5), received either after the hold time expired, too close to the hold time or requiring re-analysis after the hold time had expired.

Sample Analysis

These samples were analyzed for inorganic, organic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. For samples with a TDS ratio over 1.2 and a TDS value greater than 150 mg/L, the samples were not retested based on historical re-analysis data and the sample matrix.
2. For the TPH value on sample L29242-09 flagged with an "N1", the initial sample went dry during first few hours of extraction (methylene chloride boiled off) this is thought to be due to a loose connection in extraction apparatus. Additional methylene chloride was added when the issue was noticed and apparatus was reconnected. Because effect on data was not known, another extraction was started using 200mL of the Raw sample. This second extraction was reported due to better surrogate recovery, though surrogate passed in both extract analyses and both results confirmed "J" range result.

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-9

ACZ Sample ID: **L29242-01**

Date Sampled: 03/02/16 13:00

Date Received: 03/04/16

Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 11:03	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 8:40	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 9:08	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/08/16 18:00	mss2
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 13:01	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 16:56	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/15/16 12:01	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0016			mg/L	0.0002	0.001	03/15/16 12:01	msh
Barium, dissolved	M200.7 ICP	1	0.057			mg/L	0.003	0.02	03/08/16 16:56	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 16:56	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 16:56	aeb
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	03/08/16 16:56	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:01	msh
Calcium, dissolved	M200.7 ICP	1	44.7			mg/L	0.1	0.5	03/08/16 16:56	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 16:56	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 16:56	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 16:56	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 16:56	aeb
Iron, dissolved	M200.7 ICP	1	4.07		*	mg/L	0.02	0.05	03/08/16 16:56	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:01	msh
Lithium, dissolved	M200.7 ICP	1	0.012	B		mg/L	0.008	0.04	03/08/16 16:56	aeb
Magnesium, dissolved	M200.7 ICP	1	7.7			mg/L	0.2	1	03/08/16 16:56	aeb
Manganese, dissolved	M200.7 ICP	1	0.050			mg/L	0.005	0.03	03/08/16 16:56	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 14:36	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 16:56	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 16:56	aeb
Potassium, dissolved	M200.7 ICP	1	4.4			mg/L	0.2	1	03/08/16 16:56	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 16:56	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	03/15/16 12:01	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:01	msh
Sodium, dissolved	M200.7 ICP	1	24.7			mg/L	0.2	1	03/08/16 16:56	aeb
Strontium, dissolved	M200.7 ICP	1	0.328			mg/L	0.005	0.03	03/08/16 16:56	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:01	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 16:56	aeb
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 16:56	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:01	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 16:56	aeb
Zinc, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	03/08/16 16:56	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-9

ACZ Sample ID: **L29242-01**
Date Sampled: 03/02/16 13:00
Date Received: 03/04/16
Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	116		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	116		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			1.2			%			03/18/16 0:00	calc
Sum of Anions			4.2			meq/L			03/18/16 0:00	calc
Sum of Cations			4.3			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	7.8		*	mg/L	0.5	2	03/09/16 9:44	spl
Conductivity @25C	SM2510B	1	419		*	umhos/cm	1	10	03/08/16 17:38	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:00	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:23	pjb
Fluoride	SM4500F-C	1	0.60		*	mg/L	0.05	0.3	03/09/16 11:31	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		143			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.05	B	*	mg/L	0.02	0.1	03/11/16 21:42	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:01	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:42	bsu
pH (lab)	SM4500H+ B									
pH		1	7.4	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	20.3		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.53			mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.17		*	mg/L	0.02	0.05	03/08/16 19:22	mss2
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	03/04/16 22:38	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.15		*	mg/L	0.02	0.05	03/08/16 18:38	mss2
Residue, Filterable (TDS) @180C	SM2540C	2	336		*	mg/L	20	40	03/04/16 11:34	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:42	emk
Residue, Total (TS) @ 105C	SM2540B	2	352		*	mg/L	20	40	03/04/16 12:15	emk
Sulfate	D516-02/-07 - Turbidimetric	5	76.4		*	mg/L	5	25	03/08/16 13:26	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 14:43	sck
TDS (calculated)	Calculation		242			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.39						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-20

ACZ Sample ID: **L29242-02**
 Date Sampled: 03/02/16 12:00
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 11:11	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 8:48	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 9:32	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 9:45	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 9:35	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:05	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/15/16 12:04	msh
Arsenic, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	03/15/16 12:04	msh
Barium, dissolved	M200.7 ICP	1		U		mg/L	0.003	0.02	03/08/16 17:05	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:05	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:05	aeb
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:05	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:04	msh
Calcium, dissolved	M200.7 ICP	1		U		mg/L	0.1	0.5	03/08/16 17:05	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:05	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:05	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:05	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:05	aeb
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	03/08/16 17:05	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:04	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:05	aeb
Magnesium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/08/16 17:05	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:05	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:22	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:05	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:05	aeb
Potassium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	03/08/16 17:05	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:05	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	03/15/16 12:04	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:04	msh
Sodium, dissolved	M200.7 ICP	1	0.2	B		mg/L	0.2	1	03/08/16 17:05	aeb
Strontium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:05	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:04	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:05	aeb
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:05	aeb
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:04	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:05	aeb
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:05	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-20

ACZ Sample ID: **L29242-02**
 Date Sampled: 03/02/16 12:00
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			n/a			%			03/18/16 0:00	calc
Sum of Anions				U		meq/L			03/18/16 0:00	calc
Sum of Cations				U		meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	0.5	B	*	mg/L	0.5	2	03/09/16 9:44	spl
Conductivity @25C	SM2510B	1	1.5	B	*	umhos/cm	1	10	03/08/16 17:46	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:01	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:24	pjb
Fluoride	SM4500F-C	1		U	*	mg/L	0.05	0.3	03/09/16 11:36	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation			U		mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/11/16 21:43	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:02	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:44	bsu
pH (lab)	SM4500H+ B									
pH		1	6.1	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	20.5		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/12/16 14:31	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/04/16 22:41	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/12/16 13:34	pjb
Residue, Filterable (TDS) @180C	SM2540C	1		U	*	mg/L	10	20	03/04/16 11:36	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:45	emk
Residue, Total (TS) @ 105C	SM2540B	1		U	*	mg/L	10	20	03/04/16 12:20	emk
Sulfate	D516-02/-07 - Turbidimetric	1		U	*	mg/L	1	5	03/08/16 13:19	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 14:46	sck
TDS (calculated)	Calculation		0.7			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		n/a						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-21

ACZ Sample ID: **L29242-03**
 Date Sampled: 03/02/16 09:35
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 11:19	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 8:56	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 9:55	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:15	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 9:55	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:15	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	03/15/16 12:07	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0014			mg/L	0.0002	0.001	03/15/16 12:07	msh
Barium, dissolved	M200.7 ICP	1	0.069			mg/L	0.003	0.02	03/08/16 17:15	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:15	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:15	aeb
Boron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	03/08/16 17:15	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:07	msh
Calcium, dissolved	M200.7 ICP	1	110			mg/L	0.1	0.5	03/08/16 17:15	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:15	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:15	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:15	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:15	aeb
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	03/08/16 17:15	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:07	msh
Lithium, dissolved	M200.7 ICP	1	0.009	B		mg/L	0.008	0.04	03/08/16 17:15	aeb
Magnesium, dissolved	M200.7 ICP	1	17.1			mg/L	0.2	1	03/08/16 17:15	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:15	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:24	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:15	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:15	aeb
Potassium, dissolved	M200.7 ICP	1	6.7			mg/L	0.2	1	03/08/16 17:15	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:15	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0004			mg/L	0.0001	0.0003	03/15/16 12:07	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:07	msh
Sodium, dissolved	M200.7 ICP	1	25.2			mg/L	0.2	1	03/08/16 17:15	aeb
Strontium, dissolved	M200.7 ICP	1	0.380			mg/L	0.005	0.03	03/08/16 17:15	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:07	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:15	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B		mg/L	0.005	0.03	03/08/16 17:15	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	03/15/16 12:07	msh
Vanadium, dissolved	M200.7 ICP	1	0.006	B		mg/L	0.005	0.03	03/08/16 17:15	aeb
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:15	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-21

ACZ Sample ID: **L29242-03**
 Date Sampled: 03/02/16 09:35
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	77.0		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	77.0		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.6			%			03/18/16 0:00	calc
Sum of Anions			8.1			meq/L			03/18/16 0:00	calc
Sum of Cations			8.2			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	22.8		*	mg/L	0.5	2	03/09/16 9:44	spl
Conductivity @25C	SM2510B	1	796		*	umhos/cm	1	10	03/08/16 17:54	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:01	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:24	pjb
Fluoride	SM4500F-C	1	0.17	B	*	mg/L	0.05	0.3	03/09/16 11:40	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		345			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	4.39		*	mg/L	0.06	0.3	03/11/16 22:14	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:04	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:46	bsu
pH (lab)	SM4500H+ B									
pH		1	7.5	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	20.4		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.16	B		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/12/16 14:34	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.09	H	*	mg/L	0.02	0.05	03/04/16 22:43	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	03/12/16 13:36	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	648		*	mg/L	10	20	03/04/16 11:39	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:47	emk
Residue, Total (TS) @ 105C	SM2540B	1	656		*	mg/L	10	20	03/04/16 12:25	emk
Sulfate	D516-02/-07 - Turbidimetric	10	281		*	mg/L	10	50	03/08/16 13:43	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 14:50	sck
TDS (calculated)	Calculation		510			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.27						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: PSA-1

ACZ Sample ID: **L29242-04**
Date Sampled: 03/02/16 12:30
Date Received: 03/04/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 11:34	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 9:04	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 10:07	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:45	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:16	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:18	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/15/16 12:10	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0064			mg/L	0.0002	0.001	03/15/16 12:10	msh
Barium, dissolved	M200.7 ICP	1	0.022			mg/L	0.003	0.02	03/08/16 17:18	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:18	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:18	aeb
Boron, dissolved	M200.7 ICP	1	0.10			mg/L	0.01	0.05	03/08/16 17:18	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:10	msh
Calcium, dissolved	M200.7 ICP	1	197			mg/L	0.1	0.5	03/08/16 17:18	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:18	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:18	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:18	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:18	aeb
Iron, dissolved	M200.7 ICP	1	1.79		*	mg/L	0.02	0.05	03/08/16 17:18	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:10	msh
Lithium, dissolved	M200.7 ICP	1	0.086			mg/L	0.008	0.04	03/08/16 17:18	aeb
Magnesium, dissolved	M200.7 ICP	1	36.1			mg/L	0.2	1	03/08/16 17:18	aeb
Manganese, dissolved	M200.7 ICP	1	0.050			mg/L	0.005	0.03	03/08/16 17:18	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:26	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:18	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:18	aeb
Potassium, dissolved	M200.7 ICP	1	4.7			mg/L	0.2	1	03/08/16 17:18	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:18	aeb
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	03/15/16 12:10	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:10	msh
Sodium, dissolved	M200.7 ICP	1	46.3			mg/L	0.2	1	03/08/16 17:18	aeb
Strontium, dissolved	M200.7 ICP	1	1.920			mg/L	0.005	0.03	03/08/16 17:18	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:10	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:18	aeb
Titanium, dissolved	M200.7 ICP	1	0.009	B		mg/L	0.005	0.03	03/08/16 17:18	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0005	03/15/16 12:10	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:18	aeb
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:18	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: PSA-1

ACZ Sample ID: **L29242-04**
 Date Sampled: 03/02/16 12:30
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	160		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	160		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-3.2			%			03/18/16 0:00	calc
Sum of Anions			16			meq/L			03/18/16 0:00	calc
Sum of Cations			15			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	43		*	mg/L	0.5	2	03/09/16 9:45	spl
Conductivity @25C	SM2510B	1	1300		*	umhos/cm	1	10	03/08/16 18:03	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:03	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:25	pjb
Fluoride	SM4500F-C	1	2.55		*	mg/L	0.05	0.3	03/09/16 11:51	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		641			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	03/11/16 21:47	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:05	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:47	bsu
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	19.9		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/12/16 14:36	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/04/16 22:44	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/12/16 13:38	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	1020		*	mg/L	10	20	03/04/16 11:41	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:50	emk
Residue, Total (TS) @ 105C	SM2540B	1	1050		*	mg/L	10	20	03/04/16 12:30	emk
Sulfate	D516-02/-07 - Turbidimetric	20	525		*	mg/L	20	100	03/08/16 15:42	spl
Sulfide as S	SM4500S2-D	1	0.08	B	*	mg/L	0.02	0.1	03/09/16 14:53	sck
TDS (calculated)	Calculation		956			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.07						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-3

ACZ Sample ID: **L29242-05**
 Date Sampled: 03/02/16 11:15
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 11:50	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 9:19	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 10:19	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 11:00	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:26	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:21	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/15/16 12:13	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0022			mg/L	0.0002	0.001	03/15/16 12:13	msh
Barium, dissolved	M200.7 ICP	1	0.038			mg/L	0.003	0.02	03/08/16 17:21	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:21	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:21	aeb
Boron, dissolved	M200.7 ICP	1	0.06			mg/L	0.01	0.05	03/08/16 17:21	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:13	msh
Calcium, dissolved	M200.7 ICP	1	76.3			mg/L	0.1	0.5	03/08/16 17:21	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:21	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:21	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:21	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:21	aeb
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	03/08/16 17:21	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:13	msh
Lithium, dissolved	M200.7 ICP	1	0.015	B		mg/L	0.008	0.04	03/08/16 17:21	aeb
Magnesium, dissolved	M200.7 ICP	1	9.3			mg/L	0.2	1	03/08/16 17:21	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:21	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:28	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:21	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:21	aeb
Potassium, dissolved	M200.7 ICP	1	4.1			mg/L	0.2	1	03/08/16 17:21	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:21	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0003	03/15/16 12:13	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:13	msh
Sodium, dissolved	M200.7 ICP	1	26.9			mg/L	0.2	1	03/08/16 17:21	aeb
Strontium, dissolved	M200.7 ICP	1	0.721			mg/L	0.005	0.03	03/08/16 17:21	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:13	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:21	aeb
Titanium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	03/08/16 17:21	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	03/15/16 12:13	msh
Vanadium, dissolved	M200.7 ICP	1	0.006	B		mg/L	0.005	0.03	03/08/16 17:21	aeb
Zinc, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	03/08/16 17:21	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-3

ACZ Sample ID: **L29242-05**
 Date Sampled: 03/02/16 11:15
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	83.8		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	83.8		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			03/18/16 0:00	calc
Sum of Anions			5.9			meq/L			03/18/16 0:00	calc
Sum of Cations			5.9			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	17.1		*	mg/L	0.5	2	03/09/16 9:45	spl
Conductivity @25C	SM2510B	1	598		*	umhos/cm	1	10	03/08/16 18:19	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:05	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:27	pjb
Fluoride	SM4500F-C	1	0.75		*	mg/L	0.05	0.3	03/09/16 11:55	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		229			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.35		*	mg/L	0.02	0.1	03/11/16 21:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:10	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:48	bsu
pH (lab)	SM4500H+ B									
pH		1	7.5	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	19.4		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.25			mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.08		*	mg/L	0.02	0.05	03/12/16 14:37	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.15	H	*	mg/L	0.02	0.05	03/04/16 22:45	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.08		*	mg/L	0.02	0.05	03/12/16 13:39	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	496		*	mg/L	10	20	03/04/16 11:44	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:53	emk
Residue, Total (TS) @ 105C	SM2540B	1	500		*	mg/L	10	20	03/04/16 12:35	emk
Sulfate	D516-02/-07 - Turbidimetric	5	176		*	mg/L	5	25	03/08/16 13:27	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 14:56	sck
TDS (calculated)	Calculation		362			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.37						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-4

ACZ Sample ID: **L29242-06**
Date Sampled: 03/02/16 12:00
Date Received: 03/04/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 11:58	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 9:35	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 10:30	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 11:15	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:36	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:24	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0004	B		mg/L	0.0004	0.002	03/15/16 12:23	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0025			mg/L	0.0002	0.001	03/15/16 12:23	msh
Barium, dissolved	M200.7 ICP	1	0.027			mg/L	0.003	0.02	03/08/16 17:24	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:24	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:24	aeb
Boron, dissolved	M200.7 ICP	1	0.05		*	mg/L	0.01	0.05	03/08/16 17:24	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:23	msh
Calcium, dissolved	M200.7 ICP	1	70.7			mg/L	0.1	0.5	03/08/16 17:24	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:24	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:24	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:24	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:24	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/08/16 17:24	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:23	msh
Lithium, dissolved	M200.7 ICP	1	0.015	B		mg/L	0.008	0.04	03/08/16 17:24	aeb
Magnesium, dissolved	M200.7 ICP	1	7.7			mg/L	0.2	1	03/08/16 17:24	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:24	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:31	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:24	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:24	aeb
Potassium, dissolved	M200.7 ICP	1	4.1			mg/L	0.2	1	03/08/16 17:24	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:24	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0003	03/15/16 12:23	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:23	msh
Sodium, dissolved	M200.7 ICP	1	25		*	mg/L	0.2	1	03/08/16 17:24	aeb
Strontium, dissolved	M200.7 ICP	1	0.655			mg/L	0.005	0.03	03/08/16 17:24	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:23	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:24	aeb
Titanium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	03/08/16 17:24	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	03/15/16 12:23	msh
Vanadium, dissolved	M200.7 ICP	1	0.006	B		mg/L	0.005	0.03	03/08/16 17:24	aeb
Zinc, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/08/16 17:24	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-4

ACZ Sample ID: **L29242-06**
 Date Sampled: 03/02/16 12:00
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	86.5		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	86.5		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-0.9			%			03/18/16 0:00	calc
Sum of Anions			5.5			meq/L			03/18/16 0:00	calc
Sum of Cations			5.4			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	15.1		*	mg/L	0.5	2	03/09/16 10:07	spl
Conductivity @25C	SM2510B	1	551		*	umhos/cm	1	10	03/08/16 18:28	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:06	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:29	pjb
Fluoride	SM4500F-C	1	0.87		*	mg/L	0.05	0.3	03/09/16 11:58	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		208			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.46		*	mg/L	0.02	0.1	03/11/16 21:56	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:11	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:49	bsu
pH (lab)	SM4500H+ B									
pH		1	7.6	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	19.5		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.25			mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.08		*	mg/L	0.02	0.05	03/12/16 14:38	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.09	H	*	mg/L	0.02	0.05	03/04/16 22:46	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.07		*	mg/L	0.02	0.05	03/12/16 13:40	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	454		*	mg/L	10	20	03/04/16 11:47	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 12:55	emk
Residue, Total (TS) @ 105C	SM2540B	1	464		*	mg/L	10	20	03/04/16 12:40	emk
Sulfate	D516-02/-07 - Turbidimetric	5	156		*	mg/L	5	25	03/08/16 13:27	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 15:00	sck
TDS (calculated)	Calculation		333			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.36						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-5

ACZ Sample ID: **L29242-07**
Date Sampled: 03/02/16 09:05
Date Received: 03/04/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 12:06	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 9:43	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 10:42	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 11:30	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:46	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:28	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0004	0.002	03/15/16 12:26	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0010			mg/L	0.0002	0.001	03/15/16 12:26	msh
Barium, dissolved	M200.7 ICP	1	0.041			mg/L	0.003	0.02	03/08/16 17:28	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:28	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:28	aeb
Boron, dissolved	M200.7 ICP	1	0.04	B	*	mg/L	0.01	0.05	03/08/16 17:28	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:26	msh
Calcium, dissolved	M200.7 ICP	1	138			mg/L	0.1	0.5	03/08/16 17:28	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:28	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:28	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:28	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:28	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/08/16 17:28	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:26	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:28	aeb
Magnesium, dissolved	M200.7 ICP	1	18			mg/L	0.2	1	03/08/16 17:28	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:28	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:37	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:28	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:28	aeb
Potassium, dissolved	M200.7 ICP	1	8			mg/L	0.2	1	03/08/16 17:28	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:28	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0003	03/15/16 12:26	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:26	msh
Sodium, dissolved	M200.7 ICP	1	30.4		*	mg/L	0.2	1	03/08/16 17:28	aeb
Strontium, dissolved	M200.7 ICP	1	0.506			mg/L	0.005	0.03	03/08/16 17:28	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:26	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:28	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B		mg/L	0.005	0.03	03/08/16 17:28	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	03/15/16 12:26	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:28	aeb
Zinc, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/08/16 17:28	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-5

ACZ Sample ID: **L29242-07**
 Date Sampled: 03/02/16 09:05
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	99.5		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	99.5		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-0.5			%			03/18/16 0:00	calc
Sum of Anions			10			meq/L			03/18/16 0:00	calc
Sum of Cations			9.9			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	26		*	mg/L	0.5	2	03/09/16 10:07	spl
Conductivity @25C	SM2510B	1	941		*	umhos/cm	1	10	03/08/16 18:37	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:09	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:30	pjb
Fluoride	SM4500F-C	1	0.25	B	*	mg/L	0.05	0.3	03/09/16 12:02	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		419			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	4	6.30		*	mg/L	0.08	0.4	03/11/16 22:15	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:12	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 14:53	bsu
pH (lab)	SM4500H+ B									
pH		1	7.3	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	19.7		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	03/12/16 14:40	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	03/04/16 22:47	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/12/16 13:42	pjb
Residue, Filterable (TDS) @180C	SM2540C	2	796		*	mg/L	20	40	03/04/16 11:49	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	16.0	B	*	mg/L	5	20	03/04/16 12:58	emk
Residue, Total (TS) @ 105C	SM2540B	1	806		*	mg/L	10	20	03/04/16 12:45	emk
Sulfate	D516-02/-07 - Turbidimetric	10	344		*	mg/L	10	50	03/08/16 14:17	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 15:03	sck
TDS (calculated)	Calculation		626			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.27						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-6

ACZ Sample ID: **L29242-08**
Date Sampled: 03/02/16 08:00
Date Received: 03/04/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 12:13	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 9:51	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 10:54	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 11:45	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 10:57	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:31	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0004	0.002	03/15/16 12:35	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0024			mg/L	0.0002	0.001	03/15/16 12:35	msh
Barium, dissolved	M200.7 ICP	1	0.135			mg/L	0.003	0.02	03/08/16 17:31	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:31	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:31	aeb
Boron, dissolved	M200.7 ICP	1	0.02	B	*	mg/L	0.01	0.05	03/08/16 17:31	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:35	msh
Calcium, dissolved	M200.7 ICP	1	161			mg/L	0.1	0.5	03/08/16 17:31	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:31	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:31	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:31	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:31	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/08/16 17:31	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:35	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:31	aeb
Magnesium, dissolved	M200.7 ICP	1	19.3			mg/L	0.2	1	03/08/16 17:31	aeb
Manganese, dissolved	M200.7 ICP	1	0.007	B		mg/L	0.005	0.03	03/08/16 17:31	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:39	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:31	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:31	aeb
Potassium, dissolved	M200.7 ICP	1	8.9			mg/L	0.2	1	03/08/16 17:31	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:31	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0003	03/15/16 12:35	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:35	msh
Sodium, dissolved	M200.7 ICP	1	26.6		*	mg/L	0.2	1	03/08/16 17:31	aeb
Strontium, dissolved	M200.7 ICP	1	0.742			mg/L	0.005	0.03	03/08/16 17:31	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:35	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:31	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B		mg/L	0.005	0.03	03/08/16 17:31	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	03/15/16 12:35	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:31	aeb
Zinc, dissolved	M200.7 ICP	1	0.08			mg/L	0.01	0.05	03/08/16 17:31	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-6

ACZ Sample ID: **L29242-08**
 Date Sampled: 03/02/16 08:00
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	71.0		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	71.0		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			03/18/16 0:00	calc
Sum of Anions			11			meq/L			03/18/16 0:00	calc
Sum of Cations			11			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	28.2		*	mg/L	0.5	2	03/09/16 10:07	spl
Conductivity @25C	SM2510B	1	1030		*	umhos/cm	1	10	03/08/16 18:45	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:09	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:31	pjb
Fluoride	SM4500F-C	1	0.15	B	*	mg/L	0.05	0.3	03/09/16 12:15	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		481			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	5	10.4		*	mg/L	0.1	0.5	03/11/16 22:17	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:14	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 15:29	bsu
pH (lab)	SM4500H+ B									
pH		1	7.1	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	19.9		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.16	B		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/12/16 14:43	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.06	H	*	mg/L	0.02	0.05	03/04/16 22:51	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/12/16 13:43	pjb
Residue, Filterable (TDS) @180C	SM2540C	2	880		*	mg/L	20	40	03/04/16 11:52	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 13:00	emk
Residue, Total (TS) @ 105C	SM2540B	1	890		*	mg/L	10	20	03/04/16 12:50	emk
Sulfate	D516-02/-07 - Turbidimetric	10	400		*	mg/L	10	50	03/08/16 14:17	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 15:06	sck
TDS (calculated)	Calculation		688			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.28						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-7

ACZ Sample ID: **L29242-09**
 Date Sampled: 03/02/16 10:20
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 12:21	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 9:58	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 11:06	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 12:00	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 11:07	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:34	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0018	B		mg/L	0.0004	0.002	03/15/16 12:38	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0012			mg/L	0.0002	0.001	03/15/16 12:38	msh
Barium, dissolved	M200.7 ICP	1	0.112			mg/L	0.003	0.02	03/08/16 17:34	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:34	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:34	aeb
Boron, dissolved	M200.7 ICP	1	0.03	B	*	mg/L	0.01	0.05	03/08/16 17:34	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:38	msh
Calcium, dissolved	M200.7 ICP	1	107			mg/L	0.1	0.5	03/08/16 17:34	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:34	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:34	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:34	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:34	aeb
Iron, dissolved	M200.7 ICP	1	0.24			mg/L	0.02	0.05	03/08/16 17:34	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:38	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:34	aeb
Magnesium, dissolved	M200.7 ICP	1	15			mg/L	0.2	1	03/08/16 17:34	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:34	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:41	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:34	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:34	aeb
Potassium, dissolved	M200.7 ICP	1	7.9			mg/L	0.2	1	03/08/16 17:34	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:34	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0004			mg/L	0.0001	0.0003	03/15/16 12:38	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:38	msh
Sodium, dissolved	M200.7 ICP	1	26.5		*	mg/L	0.2	1	03/08/16 17:34	aeb
Strontium, dissolved	M200.7 ICP	1	0.414			mg/L	0.005	0.03	03/08/16 17:34	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:38	msh
Tin, dissolved	M200.7 ICP	1	0.05	B		mg/L	0.04	0.2	03/08/16 17:34	aeb
Titanium, dissolved	M200.7 ICP	1	0.006	B		mg/L	0.005	0.03	03/08/16 17:34	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	03/15/16 12:38	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:34	aeb
Zinc, dissolved	M200.7 ICP	1	0.26			mg/L	0.01	0.05	03/08/16 17:34	aeb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-7

ACZ Sample ID: **L29242-09**
Date Sampled: 03/02/16 10:20
Date Received: 03/04/16
Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	90.2		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	90.2		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			1.3			%			03/18/16 0:00	calc
Sum of Anions			7.8			meq/L			03/18/16 0:00	calc
Sum of Cations			8			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	22.8		*	mg/L	0.5	2	03/09/16 10:07	spl
Conductivity @25C	SM2510B	1	794		*	umhos/cm	1	10	03/08/16 18:53	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:10	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:33	pjb
Fluoride	SM4500F-C	1	0.22	B	*	mg/L	0.05	0.3	03/09/16 12:19	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		329			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	5.15		*	mg/L	0.06	0.3	03/11/16 22:18	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:15	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.1	B	*	mg/L	0.1	0.5	03/15/16 14:55	bsu
pH (lab)	SM4500H+ B									
pH		1	7.2	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	20.1		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/12/16 14:44	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	03/04/16 22:52	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	03/12/16 13:44	pjb
Residue, Filterable (TDS) @180C	SM2540C	2	656		*	mg/L	20	40	03/04/16 11:54	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/04/16 13:03	emk
Residue, Total (TS) @ 105C	SM2540B	1	664	H	*	mg/L	10	20	03/16/16 16:10	emk
Sulfate	D516-02/-07 - Turbidimetric	10	256		*	mg/L	10	50	03/08/16 14:20	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 15:16	sck
TDS (calculated)	Calculation		491			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.34						03/18/16 0:00	calc

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-8

ACZ Sample ID: **L29242-10**
Date Sampled: 03/02/16 09:35
Date Received: 03/04/16
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 12:29	krh
Cyanide, WAD	SM4500-CN I- distillation								03/11/16 10:06	krh
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/07/16 14:45	krh
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/10/16 12:15	spl
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/07/16 13:05	krh

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/08/16 17:37	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	03/15/16 12:42	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0013			mg/L	0.0002	0.001	03/15/16 12:42	msh
Barium, dissolved	M200.7 ICP	1	0.068			mg/L	0.003	0.02	03/08/16 17:37	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:37	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/08/16 17:37	aeb
Boron, dissolved	M200.7 ICP	1	0.03	B	*	mg/L	0.01	0.05	03/08/16 17:37	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:42	msh
Calcium, dissolved	M200.7 ICP	1	109			mg/L	0.1	0.5	03/08/16 17:37	aeb
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:37	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:37	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:37	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:37	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/08/16 17:37	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:42	msh
Lithium, dissolved	M200.7 ICP	1	0.009	B		mg/L	0.008	0.04	03/08/16 17:37	aeb
Magnesium, dissolved	M200.7 ICP	1	16.9			mg/L	0.2	1	03/08/16 17:37	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/08/16 17:37	aeb
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	03/08/16 15:47	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/08/16 17:37	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/08/16 17:37	aeb
Potassium, dissolved	M200.7 ICP	1	6.6			mg/L	0.2	1	03/08/16 17:37	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/08/16 17:37	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0004			mg/L	0.0001	0.0003	03/15/16 12:42	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/15/16 12:42	msh
Sodium, dissolved	M200.7 ICP	1	24.9		*	mg/L	0.2	1	03/08/16 17:37	aeb
Strontium, dissolved	M200.7 ICP	1	0.376			mg/L	0.005	0.03	03/08/16 17:37	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/15/16 12:42	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/08/16 17:37	aeb
Titanium, dissolved	M200.7 ICP	1	0.007	B		mg/L	0.005	0.03	03/08/16 17:37	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	03/15/16 12:42	msh
Vanadium, dissolved	M200.7 ICP	1	0.007	B		mg/L	0.005	0.03	03/08/16 17:37	aeb
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/08/16 17:37	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: MW-8

ACZ Sample ID: **L29242-10**
 Date Sampled: 03/02/16 09:35
 Date Received: 03/04/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	77.3		*	mg/L	2	20	03/08/16 0:00	sck
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/08/16 0:00	sck
Total Alkalinity		1	77.3		*	mg/L	2	20	03/08/16 0:00	sck
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-1.2			%			03/18/16 0:00	calc
Sum of Anions			8.3			meq/L			03/18/16 0:00	calc
Sum of Cations			8.1			meq/L			03/18/16 0:00	calc
Chloride	SM4500Cl-E	1	23.2		*	mg/L	0.5	2	03/09/16 10:07	spl
Conductivity @25C	SM2510B	1	803		*	umhos/cm	1	10	03/08/16 19:01	sck
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 20:11	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:34	pjb
Fluoride	SM4500F-C	1	0.17	B	*	mg/L	0.05	0.3	03/09/16 12:22	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		342			mg/L	0.2	5	03/18/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	4.38		*	mg/L	0.06	0.3	03/11/16 22:19	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/08/16 11:18	krh
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/09/16 0:17	pjb
pH (lab)	SM4500H+ B									
pH		1	7.4	H	*	units	0.1	0.1	03/08/16 0:00	sck
pH measured at		1	20.7		*	C	0.1	0.1	03/08/16 0:00	sck
Phosphate	Calculation based on dissolved Phosphorus		0.16	B		mg/L	0.06	0.2	03/18/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	03/12/16 14:45	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.07	H	*	mg/L	0.02	0.05	03/04/16 22:53	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.07		*	mg/L	0.02	0.05	03/08/16 18:39	mss2
Residue, Filterable (TDS) @180C	SM2540C	1	662		*	mg/L	10	20	03/04/16 11:57	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/07/16 16:21	emk
Residue, Total (TS) @ 105C	SM2540B	1	672		*	mg/L	10	20	03/04/16 13:00	emk
Sulfate	D516-02/-07 - Turbidimetric	10	288		*	mg/L	10	50	03/08/16 14:18	spl
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/09/16 15:26	sck
TDS (calculated)	Calculation		516			mg/L			03/18/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.28						03/18/16 0:00	calc

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-01	WG399661	Iron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
			SM4500CI-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399693	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	QD	Reported value is the background-corrected concentration, as described by the method.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-02	WG399661	Iron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
			SM4500CI-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-03	WG399661	Iron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
			SM4500CI-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-04	WG399661	Iron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
			SM4500CI-E	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-05	WG399661	Iron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

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ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-06	WG399661	Boron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-07	WG399661	Boron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-08	WG399661	Boron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-09	WG399661	Boron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399907	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399554	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG400095	Residue, Total (TS) @ 105C	SM2540B	C5	Confirmatory analysis was past holding time. Original result not confirmed.
			SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-10	WG399661	Boron, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Sodium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399689	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399701	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG399689	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399893	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399714	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
			SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG399897	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG399641	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399695	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
			M351.2 - TKN by Block Digester	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG399908	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399575	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399692	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399546	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399635	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399553	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG399669	Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG399748	Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399689	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: MW-9

ACZ Sample ID: **L29242-01**

Date Sampled: 03/02/16 13:00

Date Received: 03/04/16

Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG399879

Analyst: mmn

Extract Date: 03/09/16 10:09

Analysis Date: 03/10/16 18:40

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.9		1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	88.5		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-20

ACZ Sample ID: **L29242-02**
Date Sampled: 03/02/16 12:00
Date Received: 03/04/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399879

Analyst: mmn
Extract Date: 03/09/16 10:11
Analysis Date: 03/10/16 19:07

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	81.8		1	*	%	70	130

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: MW-21ACZ Sample ID: **L29242-03**
Date Sampled: 03/02/16 9:35
Date Received: 03/04/16
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**
Extract Method: **M3520****Workgroup:** WG399879Analyst: mmn
Extract Date: 03/09/16 10:13
Analysis Date: 03/10/16 19:35

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	78.9		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: PSA-1

ACZ Sample ID: **L29242-04**
Date Sampled: 03/02/16 12:30
Date Received: 03/04/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399879

Analyst: mmn
Extract Date: 03/09/16 10:16
Analysis Date: 03/10/16 20:02

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.05	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	83.4		1.05	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-3

ACZ Sample ID: **L29242-05**
Date Sampled: 03/02/16 11:15
Date Received: 03/04/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399879

Analyst: mmn
Extract Date: 03/09/16 10:18
Analysis Date: 03/10/16 20:30

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.3	J	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	91.1		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-4

ACZ Sample ID: **L29242-06**
Date Sampled: 03/02/16 12:00
Date Received: 03/04/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399879

Analyst: mmn
Extract Date: 03/09/16 10:20
Analysis Date: 03/11/16 13:24

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.6	J	5	*	mg/L	0.5	3
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	93.5		5	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: MW-5

ACZ Sample ID: **L29242-07**

Date Sampled: 03/02/16 9:05

Date Received: 03/04/16

Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG399879

Analyst: mmn

Extract Date: 03/09/16 10:23

Analysis Date: 03/10/16 21:52

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.3	J	1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	85.6		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: MW-6

ACZ Sample ID: **L29242-08**

Date Sampled: 03/02/16 8:00

Date Received: 03/04/16

Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG399879

Analyst: mmn

Extract Date: 03/09/16 10:25

Analysis Date: 03/10/16 22:20

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.4	J	1.03	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	86.1		1.03	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: MW-7

ACZ Sample ID: **L29242-09**

Date Sampled: 03/02/16 10:20

Date Received: 03/04/16

Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG399879

Analyst: mmn

Extract Date: 03/09/16 10:27

Analysis Date: 03/10/16 22:47

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		1.1		1	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	68.4		1	*	%	70	130

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: MW-8

ACZ Sample ID: **L29242-10**
Date Sampled: 03/02/16 9:35
Date Received: 03/04/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG399879

Analyst: mmn
Extract Date: 03/09/16 10:29
Analysis Date: 03/10/16 23:15

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.04	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	83.6		1.04	*	%	70	130

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>LCL</i>	Lower Control Limit
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #4) Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>UCL</i>	Upper Control Limit
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>SURR</i>	Surrogate	<i>LFM</i>	Laboratory Fortified Matrix
<i>INTS</i>	Internal Standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBS</i>	Prep Blank - Soil
<i>LFB</i>	Laboratory Fortified Blank	<i>PBW</i>	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
O	Analyte concentration is estimated due to result exceeding calibration range.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
J	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
- (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Excluding Oil & Grease, solid & biological matrices for organic analyses are reported on a wet weight basis.
- (3) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (4) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

ACZ Project ID: **L29242**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29242-01	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-02	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-03	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-04	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-05	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-06	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	N1	See Case Narrative.
			M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-07	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-08	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-09	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		OTP	M8015D GC/FID	SA	Surrogate recovery was outside acceptance limits due to matrix interference.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
L29242-10	WG399879	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.

Tahoe Resources, Inc.

ACZ Project ID: **L29242**

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bismuth, dissolved	M200.7 ICP
Gallium, dissolved	M200.7 ICP
Scandium, dissolved	M200.7 ICP

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Sulfide as S	SM4500S2-D
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Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29242
 Date Received: 03/04/2016 09:22
 Received By: kmo
 Date Printed: 3/4/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples? A change was made in the Date:Time Lines 1+3 on COC 1 section prior to ACZ custody.	X		

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements? L29242-01 : A Orange container not received and the associated analysis could not be run. L29242-02 : A Orange container not received and the associated analysis could not be run. L29242-03 : A Orange container not received and the associated analysis could not be run. L29242-04 : A Orange container not received and the associated analysis could not be run. L29242-05 : A Orange container not received and the associated analysis could not be run. L29242-06 : A Orange container not received and the associated analysis could not be run. L29242-07 : A Orange container not received and the associated analysis could not be run. L29242-08 : A Orange container not received and the associated analysis could not be run. L29242-09 : A Orange container not received and the associated		X	

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29242
 Date Received: 03/04/2016 09:22
 Received By: kmo
 Date Printed: 3/4/2016

analysis could not be run.

L29242-10 : A Orange container not received and the associated analysis could not be run.

16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
4164	7.8	<=6.0	13	N/A
4358	7.8	<=6.0	13	N/A
4550	6.3	<=6.0	11	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na2S2O3 preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

29242

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza
Company: Tahoe Resources Inc.
E-mail: MBerganza@sanrafael.com.gt

Address: Boulevard Los Proceres 18 calle 24-69 zona 10
Empresarial, Zona Pradera, Torre V Oficina 1406
Telephone: (502) 5951-5248

Copy of Report to:

Name:
Company:
E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tahoe Resources Inc.
E-mail: MBerganza@sanrafael.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instructions. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Table with columns: Quote #, PO#, Reporting state, Check box, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, and ANALYSES REQUESTED. Includes handwritten entries for MW-9, MW-20, MW-21 and matrix GW.

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please present one report per 3 coolers sent on 02/03/2016.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

Table with columns: RELINQUISHED BY, DATE:TIME, RECEIVED BY, DATE:TIME. Includes handwritten signatures and dates.



29242 Chain of Custody



Laboratories, Inc. *29242*

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: <i>Miguel Berganza</i>	Address: <i>Bulevar Los Proceres 18 calle 24-69 zona 0</i>
Company: <i>Tahoe Resources Inc.</i>	<i>Empresarial, Zona fradera, Torre W. oficina 1406</i>
E-mail: <i>MBerganza@sanrafael.com.gt</i>	Telephone: <i>(502) 5951 5248</i>

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: <i>Miguel Berganza</i>	Address:
Company: <i>Tahoe Resources Inc.</i>	
E-mail: <i>MBerganza@sanrafael.com.gt</i>	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: *LF* Sampler's Site Information State _____ Zip code _____ Time Zone _____

*Sampler's Signature: _____ I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: <i>Water Quality</i>	# of Containers	<i>GW+PH</i>																		
PO#: <i>Escobal</i>																				
Reporting state for compliance testing:																				
Check box if samples include NRC licensed material?																				
SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers																	
<i>PSA-1</i>	<i>02-03-16 12:30</i>	<i>GW</i>	<i>8</i>	<input checked="" type="checkbox"/>																
<i>MW-3</i>	<i>02-03-16 11:15</i>	<i>GW</i>	<i>8</i>	<input checked="" type="checkbox"/>																
<i>MW-4</i>	<i>02-03-16 12:00</i>	<i>GW</i>	<i>8</i>	<input checked="" type="checkbox"/>																
<i>MW-5</i>	<i>02-03-16 09:05</i>	<i>GW</i>	<i>8</i>	<input checked="" type="checkbox"/>																

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
<i>LF</i>	<i>02-03-2016 16:35</i>	<i>COG</i>	<i>23.16 16:35</i>
		<i>RPL</i>	<i>24/16 09:22</i>



Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

279242

CHAIN of CUSTODY

Report to:

Name: Miguel Berganza	Address: Bulevar Los Proceres 19 Calle 24-69 Zona 10
Company: Tahon Resources Inc.	Empresarial, Zona Prodera, Torre IV Oficina 1406
E-mail: MBerganza@sanrafael.com.gt	Telephone: (502) 5951 5248

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: Miguel Berganza	Address:
Company: Tahon Resources Inc.	
E-mail: MBerganza@sanrafael.com.gt	Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: [Signature] I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality	# of Containers	GW + TPH																				
PO#: Escobal																						
Reporting state for compliance testing:																						
Check box if samples include NRC licensed material?																						
SAMPLE IDENTIFICATION	DATE:TIME	Matrix																				
MW-6	02-03-16 08:00	GW	8	✓																		
MW-7	02-03-16 10:20	GW	8	✓																		
MW-8	02-03-16 09:35	GW	8	✓																		

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[Signature]	02-03-2016 16:35	[Signature]	02-03-16 16:35
		[Signature]	02-03-16 09:21

MINERA 
SAN RAFAEL

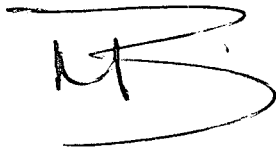
Guatemala March 2nd 2016

To whom it may concern:

Minera San Rafael, S.A is sending a case with samples of water, which is not contaminated, that are going to be analyzed by the ACZ Laboratories in Steamboat Springs, Colorado, USA.

If you have any question or doubt, please contact Miguel Berganza at Minera San Rafael, S.A. (502 - 5951-5248) or Sue Webber at ACZ Laboratories (970-879-6590).

Sincerely yours,



Miguel Berganza
Environment Department.
Mina El Escobal
Minera San Rafael, S.A.

March 21, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29329

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 10, 2016. This project has been assigned to ACZ's project number, L29329. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29329. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

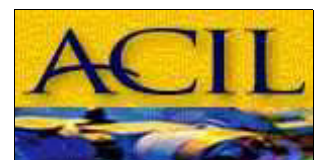
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 20, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: PSA-SR

ACZ Sample ID: **L29329-01**
 Date Sampled: 03/08/16 10:00
 Date Received: 03/10/16
 Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/17/16 8:38	enb
Cyanide, WAD	SM4500-CN I- distillation								03/15/16 15:40	spl
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 13:15	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 14:47	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/12/16 7:36	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/11/16 22:52	aeb
Antimony, dissolved	M200.8 ICP-MS	1	0.0004	B		mg/L	0.0004	0.002	03/16/16 12:59	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0129			mg/L	0.0002	0.001	03/16/16 12:59	msh
Barium, dissolved	M200.7 ICP	1	0.085			mg/L	0.003	0.02	03/11/16 22:52	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:52	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/11/16 22:52	aeb
Boron, dissolved	M200.7 ICP	1	0.10			mg/L	0.01	0.05	03/11/16 22:52	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/16/16 12:59	msh
Calcium, dissolved	M200.7 ICP	1	98.4			mg/L	0.1	0.5	03/11/16 22:52	aeb
Chromium, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/12/16 15:11	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:52	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:52	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/11/16 22:52	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/11/16 22:52	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/16/16 12:59	msh
Lithium, dissolved	M200.7 ICP	1	0.144			mg/L	0.008	0.04	03/11/16 22:52	aeb
Magnesium, dissolved	M200.7 ICP	1	6			mg/L	0.2	1	03/11/16 22:52	aeb
Manganese, dissolved	M200.7 ICP	1	0.022	B		mg/L	0.005	0.03	03/11/16 22:52	aeb
Mercury, dissolved	M245.1 CVAA	1		U	*	mg/L	0.0002	0.001	03/17/16 11:52	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/11/16 22:52	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/11/16 22:52	aeb
Potassium, dissolved	M200.7 ICP	1	2.1			mg/L	0.2	1	03/11/16 22:52	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/11/16 22:52	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0003	03/17/16 18:58	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/17/16 18:58	msh
Sodium, dissolved	M200.7 ICP	1	81.9			mg/L	0.2	1	03/11/16 22:52	aeb
Strontium, dissolved	M200.7 ICP	1	4.610		*	mg/L	0.005	0.03	03/11/16 22:52	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/16/16 12:59	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/11/16 22:52	aeb
Titanium, dissolved	M200.7 ICP	1	0.006	B		mg/L	0.005	0.03	03/11/16 22:52	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	03/16/16 12:59	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/11/16 22:52	aeb
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:52	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: PSA-SR

ACZ Sample ID: **L29329-01**
 Date Sampled: 03/08/16 10:00
 Date Received: 03/10/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	175		*	mg/L	2	20	03/10/16 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/10/16 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/10/16 0:00	emk
Total Alkalinity		1	175		*	mg/L	2	20	03/10/16 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-4.2			%			03/21/16 0:00	calc
Sum of Anions			10			meq/L			03/21/16 0:00	calc
Sum of Cations			9.2			meq/L			03/21/16 0:00	calc
Chloride	SM4500Cl-E	1	4.6		*	mg/L	0.5	2	03/15/16 15:21	krh
Conductivity @25C	SM2510B	1	883		*	umhos/cm	1	10	03/10/16 23:29	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/18/16 0:08	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/15/16 19:40	pjb
Fluoride	SM4500F-C	1	0.85		*	mg/L	0.05	0.3	03/11/16 12:51	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		270			mg/L	0.2	5	03/21/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.07	B	*	mg/L	0.02	0.1	03/18/16 23:55	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/17/16 10:47	spl
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 15:10	bsu
pH (lab)	SM4500H+ B									
pH		1	8.2	H	*	units	0.1	0.1	03/10/16 0:00	emk
pH measured at		1	20.6		*	C	0.1	0.1	03/10/16 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.06	B		mg/L	0.06	0.2	03/21/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	03/18/16 22:53	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	03/10/16 21:09	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	03/16/16 22:50	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	650		*	mg/L	10	20	03/11/16 9:53	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	03/11/16 12:40	sck
Residue, Total (TS) @105C	SM2540B	1	638		*	mg/L	10	20	03/10/16 12:43	sck
Sulfate	D516-02/-07 - Turbidimetric	10	299		*	mg/L	10	50	03/14/16 9:45	krh
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/10/16 12:56	abd
TDS (calculated)	Calculation		604			mg/L			03/21/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.08						03/21/16 0:00	calc



Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29329**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29329-01	WG400070	Mercury, dissolved	M245.1 CVAA	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399887	Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399822	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400003	Chloride	SM4500CI-E	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399822	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400178	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400028	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399852	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399822	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400231	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400120	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG399822	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
		M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG399833	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	HE	Analysis performed past holding time. Method holding time is less than or equal to 7 days and sample was received with less than half of the holding time remaining (refer to item C5 of ACZ's Terms & Conditions).	
		M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.	
		M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400105	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	
		M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG399846	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.	
WG399870	Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.	
		SM2540D	RA	Relative Percent Difference (RPD) was not used for data	

Tahoe Resources, Inc.

ACZ Project ID: **L29329**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG399809		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
			SM2540B	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG399921		Sulfate	D516-02/-07 - Turbidimetric	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
WG399817		Sulfide as S	SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG399822		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: PSA-SR

ACZ Sample ID: **L29329-01**
Date Sampled: 03/08/16 10:00
Date Received: 03/10/16
Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)

Analysis Method: **M8015D GC/FID**
Extract Method: **M3520**

Workgroup: WG400054

Analyst: itm
Extract Date: 03/14/16 17:07
Analysis Date: 03/17/16 14:08

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	1.03	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	85.7		1.03	*	%	70	130

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>LCL</i>	Lower Control Limit
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #4) Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>UCL</i>	Upper Control Limit
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>SURR</i>	Surrogate	<i>LFM</i>	Laboratory Fortified Matrix
<i>INTS</i>	Internal Standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBS</i>	Prep Blank - Soil
<i>LFB</i>	Laboratory Fortified Blank	<i>PBW</i>	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
O	Analyte concentration is estimated due to result exceeding calibration range.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
J	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
- (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Excluding Oil & Grease, solid & biological matrices for organic analyses are reported on a wet weight basis.
- (3) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (4) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

ACZ Project ID: **L29329**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29329-01	WG400054	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29329**

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bismuth, dissolved	M200.7 ICP
Gallium, dissolved	M200.7 ICP
Scandium, dissolved	M200.7 ICP

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29329
 Date Received: 03/10/2016 09:47
 Received By: ddp
 Date Printed: 3/10/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements? L29329-01 : A Orange container not received and the associated analysis could not be run.		X	
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
2960	6.7	<=6.0	12	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29329
Date Received: 03/10/2016 09:47
Received By: ddp
Date Printed: 3/10/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

29329

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miquel Berganza, Company: Tahoe Resources Inc., E-mail: MBerganza@saurafael.com.gt, Address: Bulevar Los Páceres 18 calle 24-69 Zona 10, Empresa Zonal, Zona Proadera, Tercer Oficina 1406, Telephone: (502) 5951 5248

Copy of Report to:

Name: , Company: , E-mail: , Telephone:

Invoice to:

Name: Miquel Berganza, Company: Tahoe Resources Inc., E-mail: MBerganza@saurafael.com.gt, Address: , Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF, Sampler's Site Information, State, Zip code, Time Zone

*Sampler's Signature: [Signature] I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality, PO#: Escobal, Reporting state for compliance testing: , Check box if samples include NRC licensed material?

Table with columns: SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, GW+TEH, total CN. Rows include PSA-SR, Pileta 2, Pileta 3, Pozo PP, EP-10, Pileta de Proceso, Agua de proceso, WW9, WW3, WW14.

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Report PSA-SR in a different report.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

Table with columns: RELINQUISHED BY, DATE:TIME, RECEIVED BY, DATE:TIME. Includes signatures and dates like 08/03/16 10:00 and 08/31/16 15:00.



March 21, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29328

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 10, 2016. This project has been assigned to ACZ's project number, L29328. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29328. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

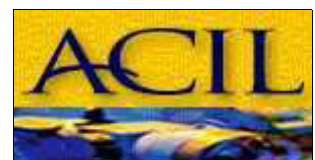
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 20, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: HW-1

ACZ Sample ID: **L29328-01**

Date Sampled: 03/08/16 09:35

Date Received: 03/10/16

Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/17/16 8:30	enb
Cyanide, WAD	SM4500-CN I- distillation								03/15/16 15:30	spl
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								03/11/16 13:03	spl
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								03/17/16 14:36	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								03/12/16 7:29	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1		U		mg/L	0.03	0.2	03/11/16 22:43	aeb
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	03/16/16 12:56	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0098			mg/L	0.0002	0.001	03/16/16 12:56	msh
Barium, dissolved	M200.7 ICP	1	0.069			mg/L	0.003	0.02	03/11/16 22:43	aeb
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:43	aeb
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	03/11/16 22:43	aeb
Boron, dissolved	M200.7 ICP	1	0.07			mg/L	0.01	0.05	03/11/16 22:43	aeb
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/16/16 12:56	msh
Calcium, dissolved	M200.7 ICP	1	76.3			mg/L	0.1	0.5	03/11/16 22:43	aeb
Chromium, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	03/12/16 14:55	aeb
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:43	aeb
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:43	aeb
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/11/16 22:43	aeb
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	03/11/16 22:43	aeb
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/16/16 12:56	msh
Lithium, dissolved	M200.7 ICP	1	0.112			mg/L	0.008	0.04	03/11/16 22:43	aeb
Magnesium, dissolved	M200.7 ICP	1	5.1			mg/L	0.2	1	03/11/16 22:43	aeb
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/11/16 22:43	aeb
Mercury, dissolved	M245.1 CVAA	1		U	*	mg/L	0.0002	0.001	03/17/16 17:06	pta
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	03/11/16 22:43	aeb
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	03/11/16 22:43	aeb
Potassium, dissolved	M200.7 ICP	1	2.2			mg/L	0.2	1	03/11/16 22:43	aeb
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	03/11/16 22:43	aeb
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0003	03/17/16 18:55	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	03/17/16 18:55	msh
Sodium, dissolved	M200.7 ICP	1	64.9			mg/L	0.2	1	03/11/16 22:43	aeb
Strontium, dissolved	M200.7 ICP	1	3.440		*	mg/L	0.005	0.03	03/11/16 22:43	aeb
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	03/16/16 12:56	msh
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	03/11/16 22:43	aeb
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/11/16 22:43	aeb
Uranium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	03/16/16 12:56	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	03/11/16 22:43	aeb
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	03/11/16 22:43	aeb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: HW-1

ACZ Sample ID: **L29328-01**
 Date Sampled: 03/08/16 09:35
 Date Received: 03/10/16
 Sample Matrix: Ground Water

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration									
Bicarbonate as CaCO3		1	145		*	mg/L	2	20	03/10/16 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	03/10/16 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	03/10/16 0:00	emk
Total Alkalinity		1	145		*	mg/L	2	20	03/10/16 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-4.6			%			03/21/16 0:00	calc
Sum of Anions			7.9			meq/L			03/21/16 0:00	calc
Sum of Cations			7.2			meq/L			03/21/16 0:00	calc
Chloride	SM4500Cl-E	1	4.7		*	mg/L	0.5	2	03/15/16 15:21	krh
Conductivity @25C	SM2510B	1	729		*	umhos/cm	1	10	03/10/16 23:20	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/18/16 0:07	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/15/16 19:40	pjb
Fluoride	SM4500F-C	1	0.68		*	mg/L	0.05	0.3	03/11/16 12:48	sck
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		212			mg/L	0.2	5	03/21/16 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.42		*	mg/L	0.02	0.1	03/18/16 23:53	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	03/17/16 10:46	spl
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	03/15/16 15:09	bsu
pH (lab)	SM4500H+ B									
pH		1	8.2	H	*	units	0.1	0.1	03/10/16 0:00	emk
pH measured at		1	20.9		*	C	0.1	0.1	03/10/16 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	03/21/16 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	03/18/16 22:50	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	03/10/16 21:07	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	03/16/16 22:47	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	542		*	mg/L	10	20	03/11/16 9:50	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	2		U	*	mg/L	10	40	03/12/16 10:52	sck
Residue, Total (TS) @ 105C	SM2540B	1	534		*	mg/L	10	20	03/10/16 12:40	sck
Sulfate	D516-02/-07 - Turbidimetric	10	232		*	mg/L	10	50	03/14/16 9:45	krh
Sulfide as S	SM4500S2-D	1		U	*	mg/L	0.02	0.1	03/10/16 12:53	abd
TDS (calculated)	Calculation		478			mg/L			03/21/16 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.13						03/21/16 0:00	calc



Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29328**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29328-01	WG400112	Mercury, dissolved	M245.1 CVAA	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399887	Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG399822	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400003	Chloride	SM4500CI-E	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG399822	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG400178	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400028	Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			SM4500-CN I,E-Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399852	Fluoride	SM4500F-C	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500F-C	Q6	Sample was received above recommended temperature.
	WG399822	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG400231	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400120	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
			M350.1 Auto Salicylate w/gas diffusion	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400020	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG399822	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG400230	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399833	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.
			M365.1 - Automated Ascorbic Acid	Q6	Sample was received above recommended temperature.
			M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400105	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399846	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG399900	Residue, Non-Filterable (TSS) @105C	SM2540D	DJ	Sample dilution required due to insufficient sample.
			SM2540D	Q6	Sample was received above recommended temperature.
			SM2540D	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated

Tahoe Resources, Inc.

ACZ Project ID: **L29328**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG399809	Residue, Total (TS) @ 105C	SM2540B SM2540B	Q6 RA	sample is too low for accurate evaluation (< 10x MDL). Sample was received above recommended temperature. Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399921	Sulfate	D516-02/-07 - Turbidimetric D516-02/-07 - Turbidimetric	M2 Q6	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable. Sample was received above recommended temperature.
	WG399817	Sulfide as S	SM4500S2-D SM4500S2-D	Q6 RA	Sample was received above recommended temperature. Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG399822	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
L29328-02	WG400027	Cyanide, total	M335.4 - Colorimetric w/ distillation M335.4 - Colorimetric w/ distillation	Q6 RA	Sample was received above recommended temperature. Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L29328-03	WG400027	Cyanide, total	M335.4 - Colorimetric w/ distillation M335.4 - Colorimetric w/ distillation	Q6 RA	Sample was received above recommended temperature. Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L29328-04	WG400027	Cyanide, total	M335.4 - Colorimetric w/ distillation M335.4 - Colorimetric w/ distillation	Q6 RA	Sample was received above recommended temperature. Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: HW-1

ACZ Sample ID: **L29328-01**

Date Sampled: 03/08/16 9:35

Date Received: 03/10/16

Sample Matrix: Ground Water

Diesel Range Organics (C10-C28)Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG400054

Analyst: itm

Extract Date: 03/14/16 17:05

Analysis Date: 03/17/16 13:41

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.99	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	87		0.99	*	%	70	130

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>LCL</i>	Lower Control Limit
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #4) Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>UCL</i>	Upper Control Limit
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>SURR</i>	Surrogate	<i>LFM</i>	Laboratory Fortified Matrix
<i>INTS</i>	Internal Standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>MS/MSD</i>	Matrix Spike/Matrix Spike Duplicate
<i>LCSW</i>	Laboratory Control Sample - Water	<i>PBS</i>	Prep Blank - Soil
<i>LFB</i>	Laboratory Fortified Blank	<i>PBW</i>	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
O	Analyte concentration is estimated due to result exceeding calibration range.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
J	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
- (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Excluding Oil & Grease, solid & biological matrices for organic analyses are reported on a wet weight basis.
- (3) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (4) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

ACZ Project ID: **L29328**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29328-01	WG400054	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29328**

Metals Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Bismuth, dissolved	M200.7 ICP
Gallium, dissolved	M200.7 ICP
Scandium, dissolved	M200.7 ICP

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29328
 Date Received: 03/10/2016 09:47
 Received By: ddp
 Date Printed: 3/10/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹	X		
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements? L29328-01 : A Orange container not received and the associated analysis could not be run.		X	
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time? Some parameters were received past hold time.		X	

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
2960	6.7	<=6.0	12	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29328
Date Received: 03/10/2016 09:47
Received By: ddp
Date Printed: 3/10/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

29328

CHAIN of CUSTODY

Report to:

Name: Miguel Berganza
Company: Tahoe Resources inc.
E-mail: MBerganza@sanrafael.com.gt

Address: Puleta Los Proceres 18 calle 24-69 zona 10
Empresarial, Zona Fradera, Torre IV oficina 1406
Telephone: (502) 5951 5248

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tahoe Resources inc.
E-mail: MBerganza@sanrafael.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses?

YES []
NO []

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring?

Yes [] No []

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LE Sampler's Site Information State Zip code Time Zone

*Sampler's Signature: [Signature] I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION:

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water Quality
PO#: Escobal
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

Table with columns: # of Containers, GW+TPH, TOTAL, and multiple empty columns for analysis results.

Table with columns: SAMPLE IDENTIFICATION, DATE:TIME, Matrix, and multiple empty columns for analysis results.

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY: DATE:TIME RECEIVED BY: DATE:TIME

Handwritten signatures and dates for relinquished and received parties.



29328 Chain of Custody



Guatemala March 8th 2016

To whom it may concern:

Minera San Rafael, S.A is sending a case with samples of water, which is not contaminated, that are going to be analyzed by the ACZ Laboratories in Steamboat Springs, Colorado, USA.

If you have any question or doubt, please contact Miguel Berganza at Minera San Rafael, S.A. (502 - 5951-5248) or Sue Webber at ACZ Laboratories (970-879-6590).

Sincerely yours,

Miguel Berganza
Environment Department.
Mina El Escobal
Minera San Rafael, S.A.

REG 016 Resultados de Análisis

Muestras: 6 muestras de agua
Análisis solicitado por: Ing. Miguel Berganza
Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa
Procedencia de la muestra: Proyecto Escobal
Fecha de muestreo: 010316
Fecha de ingreso de muestra: 010316
Fecha de análisis: 010316-100316
Fecha del informe: 100316

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	Cromo Hexavalente Cr(VI) mg/l	* Coliformes Fecales (NMP/100ml)
4003	GW-2	29	<1	N.D.	< 2
4004	GW-3	< 1	< 1	N.D.	4.5
4005	GW-10	< 1	< 1	N.D.	< 2
4006	GW-11	< 1	< 1	N.D.	< 2
4007	MW-11	76	< 1	N.D.	< 2
4008	RW-1	< 1	< 1	N.D.	540

Notas:

Captación de muestras: Las muestras fueron captadas por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración.

Metodología: Espectrofotométricos / SMWW: Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977.

Fotométricos Merck. NMP: Número más Probable.

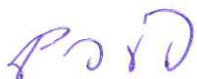
N.D. No detectable. Debajo del límite de detección.

Límites de detección: Cromo hexavalente (0.05 mg/l)

Los resultados obtenidos corresponden únicamente a las muestras recibidas por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

** Análisis referidos.*



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

REG 016 Resultados de Análisis

Muestras: 10 muestras de agua

Análisis solicitado por: Ing. Miguel Berganza

Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa

Procedencia de la muestra: Proyecto Escobal

Fecha de muestreo: 020316

Fecha de ingreso de muestra: 020316

Fecha de análisis: 020316-110316

Fecha del informe: 110316

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	Cromo Hexavalente Cr(VI) mg/l	* Coliformes Fecales (NMP/100ml)
4017	PSA-1	255	<1	N.D.	< 2
4018	MW-3	< 1	< 1	N.D.	< 2
4019	MW-4	< 1	< 1	N.D.	< 2
4020	MW-5	< 1	< 1	N.D.	9.4 x 10 ⁴
4021	MW-6	< 1	< 1	N.D.	4.5
4022	MW-7	< 1	< 1	N.D.	23
4023	MW-8	< 1	< 1	N.D.	< 2
4024	MW-9	< 1	< 1	N.D.	4.5
4025	MW-20	< 1	< 1	N.D.	< 2
4026	MW-21	< 1	< 1	N.D.	< 2

Notas:

Captación de muestras: Las muestras fueron captadas por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración.

Metodología: Espectrofotométricos / SMWW: Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977.

Fotométricos Merck. NMP: Número más Probable.

N.D. No detectable. Debajo del límite de detección.

Límites de detección: Cromo hexavalente (0.05 mg/l)

Los resultados obtenidos corresponden únicamente a las muestras recibidas por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

** Análisis referidos.*



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

REG 016 Resultados de Análisis

Muestras: 1 muestra de agua
Análisis solicitado por: Ing. Miguel Berganza
Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores, Santa Rosa
Procedencia de la muestra: Proyecto Escobal
Fecha de muestreo: 080316
Fecha de ingreso de muestras: 080316
Fecha de análisis: 080316-170316
Fecha de informe: 170316

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	Cromo Hexavalente Cr(VI) mg/l	* Coliformes Fecales (NMP/100ml)
4100	PSA-SR	< 1	< 1	N.D.	< 2

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración.

Metodología: Espectrofotométricos / SMWW: Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977.

Fotométricos Merck. NMP: Número más Probable.

N.D. No detectable. Debajo del limite de detección.

Límites de detección: Cromo hexavalente (0.05 mg/l)

El resultado obtenido corresponde únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

** Análisis referidos.*



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

REG 016 Resultados de Análisis

Muestras: 1 muestra de agua
Análisis solicitado por: Ing. Miguel Berganza
Dirección: Km. 97.5 carretera Mataquescuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa
Procedencia de la muestra: Proyecto Escobal
Fecha de muestreo: 080316
Fecha de ingreso de muestras: 080316
Fecha de análisis: 080316-170316
Fecha de informe: 170316

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	Cromo Hexavalente Cr(VI) mg/l	* Coliformes Fecales (NMP/100ml)
4096	HW-1	< 1	< 1	N.D.	< 2

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración.

Metodología: Espectrofotométricos / SMWW: Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977.

Fotométricos Merck. NMP: Número más probable.

N.D. No detectable. Debajo del límite de detección.

Límites de detección: Cromo hexavalente (0.05 mg/l)

El resultado obtenido corresponde únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

** Análisis referidos.*



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

11.6 Informes originales de los Resultados Analíticos obtenidos del muestreo de sedimentos, Junio 2016

April 20, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29653

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 30, 2016. This project has been assigned to ACZ's project number, L29653. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29653. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

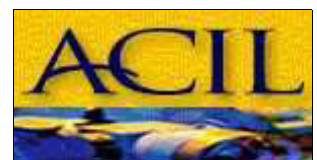
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 20, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

April 20, 2016

Project ID: Escobal

ACZ Project ID: L29653

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 10 sediment samples from Tahoe Resources, Inc. on March 30, 2016. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L29653. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for parameters flagged with "H" flags (H3, H1), received either after the hold time expired or too close to the hold time.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following required further explanation not provided by the Extended Qualifier Report:

1. For Total Mercury values flagged with an "N1", the LCSS/D recovery was low. Matrix spikes and spike duplicates had recoveries and RPD within method limits for both soil and sludge matrices. Precision and accuracy are demonstrated on the test matrix. No further action was taken.

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-1

ACZ Sample ID: **L29653-01**
Date Sampled: 03/14/16 09:55
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 8:13	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 9:24	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50500	14500		*	mg/Kg	50	300	04/18/16 19:07	msh
Antimony, total (3050)	M6020 ICP-MS	505	0.7	B	*	mg/Kg	0.2	1	04/14/16 13:54	msh
Arsenic, total (3050)	M6020 ICP-MS	505	8.2			mg/Kg	0.1	0.5	04/14/16 13:54	msh
Barium, total (3050)	M6020 ICP-MS	505	201		*	mg/Kg	0.3	1	04/14/16 13:54	msh
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	04/08/16 14:31	gss
Cadmium, total (3050)	M6020 ICP-MS	505	0.56		*	mg/Kg	0.05	0.3	04/14/16 13:54	msh
Calcium, total (3050)	M6010B ICP	101	3530			mg/Kg	10	50	04/08/16 14:31	gss
Chromium, total (3050)	M6020 ICP-MS	505	3.6			mg/Kg	0.3	1	04/14/16 13:54	msh
Copper, total (3050)	M6020 ICP-MS	505	12.9			mg/Kg	0.3	1	04/14/16 13:54	msh
Iron, total (3050)	M6010B ICP	101	13300		*	mg/Kg	2	5	04/08/16 14:31	gss
Lead, total (3050)	M6020 ICP-MS	505	13.0		*	mg/Kg	0.05	0.3	04/14/16 13:54	msh
Magnesium, total (3050)	M6010B ICP	101	1410		*	mg/Kg	20	100	04/08/16 14:31	gss
Manganese, total (3050)	M6020 ICP-MS	505	565		*	mg/Kg	0.3	1	04/14/16 13:54	msh
Mercury, total	M7471A CVAA	254		U	*	mg/Kg	0.05	0.3	04/11/16 12:56	mfm
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	04/08/16 14:31	gss
Nickel, total (3050)	M6020 ICP-MS	505	5.2			mg/Kg	0.3	2	04/14/16 13:54	msh
Potassium, total (3050)	M6010B ICP	101	1870			mg/Kg	20	100	04/08/16 14:31	gss
Selenium, total (3050)	M6020 ICP-MS	505	0.20			mg/Kg	0.05	0.1	04/14/16 13:54	msh
Silver, total (3050)	M6020 ICP-MS	505	0.13			mg/Kg	0.03	0.1	04/14/16 13:54	msh
Zinc, total (3050)	M6020 ICP-MS	505	48		*	mg/Kg	1	3	04/14/16 13:54	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	64.3		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:30	rbt
Digestion - Hot Plate	M3050B ICP								04/07/16 12:56	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 12:56	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:10	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-1

ACZ Sample ID: **L29653-01**

Date Sampled: 03/14/16 09:55

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	30		UH	*	mg/Kg	0.2	0.6	03/31/16 14:36	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	63.2	0.0248		*	%	0.00126	0.00316	04/01/16 23:06	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-2

ACZ Sample ID: **L29653-02**

Date Sampled: 03/14/16 08:55

Date Received: 03/30/16

Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 8:36	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 9:37	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	51000	21500		*	mg/Kg	50	300	04/18/16 19:09	msh
Antimony, total (3050)	M6020 ICP-MS	510	6.2		*	mg/Kg	0.2	1	04/14/16 14:00	msh
Arsenic, total (3050)	M6020 ICP-MS	510	45.7			mg/Kg	0.1	0.5	04/14/16 14:00	msh
Barium, total (3050)	M6020 ICP-MS	510	186		*	mg/Kg	0.3	1	04/14/16 14:00	msh
Boron, total (3050)	M6010B ICP	102	6			mg/Kg	1	5	04/08/16 14:34	gss
Cadmium, total (3050)	M6020 ICP-MS	510	15.70		*	mg/Kg	0.05	0.3	04/14/16 14:00	msh
Calcium, total (3050)	M6010B ICP	102	24700			mg/Kg	10	50	04/08/16 14:34	gss
Chromium, total (3050)	M6020 ICP-MS	510	11.7			mg/Kg	0.3	1	04/14/16 14:00	msh
Copper, total (3050)	M6020 ICP-MS	510	44.9			mg/Kg	0.3	1	04/14/16 14:00	msh
Iron, total (3050)	M6010B ICP	102	17500		*	mg/Kg	2	5	04/08/16 14:34	gss
Lead, total (3050)	M6020 ICP-MS	510	806		*	mg/Kg	0.05	0.3	04/14/16 14:00	msh
Magnesium, total (3050)	M6010B ICP	102	4170		*	mg/Kg	20	100	04/08/16 14:34	gss
Manganese, total (3050)	M6020 ICP-MS	51000	2200		*	mg/Kg	30	100	04/18/16 19:09	msh
Mercury, total	M7471A CVAA	397	0.20	B	*	mg/Kg	0.08	0.4	04/11/16 12:58	mfm
Molybdenum, total (3050)	M6010B ICP	102	5	B		mg/Kg	2	10	04/08/16 14:34	gss
Nickel, total (3050)	M6020 ICP-MS	510	8.8			mg/Kg	0.3	2	04/14/16 14:00	msh
Potassium, total (3050)	M6010B ICP	102	2140			mg/Kg	20	100	04/08/16 14:34	gss
Selenium, total (3050)	M6020 ICP-MS	510	0.50			mg/Kg	0.05	0.1	04/14/16 14:00	msh
Silver, total (3050)	M6020 ICP-MS	51000	54			mg/Kg	3	10	04/19/16 17:03	msh
Zinc, total (3050)	M6020 ICP-MS	510	1230		*	mg/Kg	1	3	04/14/16 14:00	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	37.6		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:31	rbt
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 13:54	bcc
Digestion - Hot Plate	M3050B ICP								04/07/16 13:54	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:15	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-2

ACZ Sample ID: **L29653-02**

Date Sampled: 03/14/16 08:55

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	48.2	1.1	H	*	mg/Kg	0.3	1	03/31/16 14:38	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	124	0.0589		*	%	0.00248	0.0062	04/01/16 23:07	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-2A

ACZ Sample ID: **L29653-03**
Date Sampled: 03/16/16 11:35
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 8:59	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 9:50	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	51000	27600		*	mg/Kg	50	300	04/18/16 19:13	msh
Antimony, total (3050)	M6020 ICP-MS	510	2.9		*	mg/Kg	0.2	1	04/14/16 14:03	msh
Arsenic, total (3050)	M6020 ICP-MS	510	35.1			mg/Kg	0.1	0.5	04/14/16 14:03	msh
Barium, total (3050)	M6020 ICP-MS	510	261		*	mg/Kg	0.3	1	04/14/16 14:03	msh
Boron, total (3050)	M6010B ICP	102	4	B		mg/Kg	1	5	04/08/16 14:37	gss
Cadmium, total (3050)	M6020 ICP-MS	510	5.91		*	mg/Kg	0.05	0.3	04/14/16 14:03	msh
Calcium, total (3050)	M6010B ICP	102	15700			mg/Kg	10	50	04/08/16 14:37	gss
Chromium, total (3050)	M6020 ICP-MS	510	7.9			mg/Kg	0.3	1	04/14/16 14:03	msh
Copper, total (3050)	M6020 ICP-MS	510	28.8			mg/Kg	0.3	1	04/14/16 14:03	msh
Iron, total (3050)	M6010B ICP	102	18000		*	mg/Kg	2	5	04/08/16 14:37	gss
Lead, total (3050)	M6020 ICP-MS	510	256		*	mg/Kg	0.05	0.3	04/14/16 14:03	msh
Magnesium, total (3050)	M6010B ICP	102	3220		*	mg/Kg	20	100	04/08/16 14:37	gss
Manganese, total (3050)	M6020 ICP-MS	51000	2570		*	mg/Kg	30	100	04/18/16 19:13	msh
Mercury, total	M7471A CVAA	424	0.13	B	*	mg/Kg	0.08	0.4	04/11/16 13:00	mfm
Molybdenum, total (3050)	M6010B ICP	102	4	B		mg/Kg	2	10	04/08/16 14:37	gss
Nickel, total (3050)	M6020 ICP-MS	510	6.9			mg/Kg	0.3	2	04/14/16 14:03	msh
Potassium, total (3050)	M6010B ICP	102	1890			mg/Kg	20	100	04/08/16 14:37	gss
Selenium, total (3050)	M6020 ICP-MS	510	0.32			mg/Kg	0.05	0.1	04/14/16 14:03	msh
Silver, total (3050)	M6020 ICP-MS	510	19.60			mg/Kg	0.03	0.1	04/14/16 14:03	msh
Zinc, total (3050)	M6020 ICP-MS	510	491		*	mg/Kg	1	3	04/14/16 14:03	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	42.9		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:33	rbt
Digestion - Hot Plate	M3050B ICP								04/07/16 14:53	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 14:53	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:21	rbt

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SED-2AACZ Sample ID: **L29653-03**
Date Sampled: 03/16/16 11:35
Date Received: 03/30/16
Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	44.3		UH	*	mg/Kg	0.3	0.9	03/31/16 14:40	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	110	0.0424		*	%	0.0022	0.0055	04/01/16 23:09	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-3

ACZ Sample ID: **L29653-04**
Date Sampled: 03/16/16 11:10
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 9:11	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 10:03	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50000	6020		*	mg/Kg	50	300	04/18/16 19:16	msh
Antimony, total (3050)	M6020 ICP-MS	500	0.9	B	*	mg/Kg	0.2	1	04/14/16 14:06	msh
Arsenic, total (3050)	M6020 ICP-MS	500	7.7			mg/Kg	0.1	0.5	04/14/16 14:06	msh
Barium, total (3050)	M6020 ICP-MS	500	108		*	mg/Kg	0.3	1	04/14/16 14:06	msh
Boron, total (3050)	M6010B ICP	100	1	B		mg/Kg	1	5	04/08/16 14:40	gss
Cadmium, total (3050)	M6020 ICP-MS	500	0.23	B	*	mg/Kg	0.05	0.3	04/14/16 14:06	msh
Calcium, total (3050)	M6010B ICP	100	2170			mg/Kg	10	50	04/08/16 14:40	gss
Chromium, total (3050)	M6020 ICP-MS	500	2.7			mg/Kg	0.3	1	04/14/16 14:06	msh
Copper, total (3050)	M6020 ICP-MS	500	4			mg/Kg	0.3	1	04/14/16 14:06	msh
Iron, total (3050)	M6010B ICP	100	8590		*	mg/Kg	2	5	04/08/16 14:40	gss
Lead, total (3050)	M6020 ICP-MS	500	6.34		*	mg/Kg	0.05	0.3	04/14/16 14:06	msh
Magnesium, total (3050)	M6010B ICP	100	720		*	mg/Kg	20	100	04/08/16 14:40	gss
Manganese, total (3050)	M6020 ICP-MS	500	431		*	mg/Kg	0.3	1	04/14/16 14:06	msh
Mercury, total	M7471A CVAA	199	0.12	B	*	mg/Kg	0.04	0.2	04/11/16 13:07	mfm
Molybdenum, total (3050)	M6010B ICP	100		U		mg/Kg	2	10	04/08/16 14:40	gss
Nickel, total (3050)	M6020 ICP-MS	500	2.2			mg/Kg	0.3	2	04/14/16 14:06	msh
Potassium, total (3050)	M6010B ICP	100	1370			mg/Kg	20	100	04/08/16 14:40	gss
Selenium, total (3050)	M6020 ICP-MS	500	0.05	B		mg/Kg	0.05	0.1	04/14/16 14:06	msh
Silver, total (3050)	M6020 ICP-MS	500	0.03	B		mg/Kg	0.03	0.1	04/14/16 14:06	msh
Zinc, total (3050)	M6020 ICP-MS	500	28		*	mg/Kg	1	3	04/14/16 14:06	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	84.1		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:35	rbt
Digestion - Hot Plate	M3050B ICP								04/07/16 15:52	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 15:52	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:26	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-3

ACZ Sample ID: **L29653-04**

Date Sampled: 03/16/16 11:10

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	28.6		UH	*	mg/Kg	0.2	0.6	03/31/16 14:40	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	44.6	0.0126		*	%	0.00089	0.00223	04/01/16 23:10	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-4

ACZ Sample ID: **L29653-05**
Date Sampled: 03/14/16 08:15
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 9:22	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 10:16	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	51000	21200		*	mg/Kg	50	300	04/18/16 19:22	msh
Antimony, total (3050)	M6020 ICP-MS	510	2.6		*	mg/Kg	0.2	1	04/14/16 14:15	msh
Arsenic, total (3050)	M6020 ICP-MS	510	19.4			mg/Kg	0.1	0.5	04/14/16 14:15	msh
Barium, total (3050)	M6020 ICP-MS	510	232		*	mg/Kg	0.3	1	04/14/16 14:15	msh
Boron, total (3050)	M6010B ICP	102	4	B		mg/Kg	1	5	04/08/16 14:48	gss
Cadmium, total (3050)	M6020 ICP-MS	510	1.35		*	mg/Kg	0.05	0.3	04/14/16 14:15	msh
Calcium, total (3050)	M6010B ICP	102	6430			mg/Kg	10	50	04/08/16 14:48	gss
Chromium, total (3050)	M6020 ICP-MS	510	11.4			mg/Kg	0.3	1	04/14/16 14:15	msh
Copper, total (3050)	M6020 ICP-MS	510	32.9			mg/Kg	0.3	1	04/14/16 14:15	msh
Iron, total (3050)	M6010B ICP	102	17900		*	mg/Kg	2	5	04/08/16 14:48	gss
Lead, total (3050)	M6020 ICP-MS	510	49.10		*	mg/Kg	0.05	0.3	04/14/16 14:15	msh
Magnesium, total (3050)	M6010B ICP	102	1490		*	mg/Kg	20	100	04/08/16 14:48	gss
Manganese, total (3050)	M6020 ICP-MS	51000	1350		*	mg/Kg	30	100	04/18/16 19:22	msh
Mercury, total	M7471A CVAA	596		U	*	mg/Kg	0.1	0.6	04/11/16 13:09	mfm
Molybdenum, total (3050)	M6010B ICP	102		U		mg/Kg	2	10	04/08/16 14:48	gss
Nickel, total (3050)	M6020 ICP-MS	510	4.2			mg/Kg	0.3	2	04/14/16 14:15	msh
Potassium, total (3050)	M6010B ICP	102	2000			mg/Kg	20	100	04/08/16 14:48	gss
Selenium, total (3050)	M6020 ICP-MS	510	0.76			mg/Kg	0.05	0.1	04/14/16 14:15	msh
Silver, total (3050)	M6020 ICP-MS	510	1.85			mg/Kg	0.03	0.1	04/14/16 14:15	msh
Zinc, total (3050)	M6020 ICP-MS	510	180		*	mg/Kg	1	3	04/14/16 14:15	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	29.9		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:36	rbt
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 18:48	bcc
Digestion - Hot Plate	M3050B ICP								04/07/16 18:48	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:32	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-4

ACZ Sample ID: **L29653-05**

Date Sampled: 03/14/16 08:15

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	47.2	0.3	BH	*	mg/Kg	0.3	0.9	03/31/16 14:41	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	820	0.123		*	%	0.0164	0.041	04/01/16 23:33	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-4A

ACZ Sample ID: **L29653-06**

Date Sampled: 03/16/16 11:00

Date Received: 03/30/16

Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 9:34	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 10:29	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50500	18900		*	mg/Kg	50	300	04/18/16 19:24	msh
Antimony, total (3050)	M6020 ICP-MS	505	2.6		*	mg/Kg	0.2	1	04/14/16 14:18	msh
Arsenic, total (3050)	M6020 ICP-MS	505	21.6			mg/Kg	0.1	0.5	04/14/16 14:18	msh
Barium, total (3050)	M6020 ICP-MS	505	256		*	mg/Kg	0.3	1	04/14/16 14:18	msh
Boron, total (3050)	M6010B ICP	101	3	B		mg/Kg	1	5	04/08/16 14:57	gss
Cadmium, total (3050)	M6020 ICP-MS	505	1.62		*	mg/Kg	0.05	0.3	04/14/16 14:18	msh
Calcium, total (3050)	M6010B ICP	101	6020			mg/Kg	10	50	04/08/16 14:57	gss
Chromium, total (3050)	M6020 ICP-MS	505	8.5			mg/Kg	0.3	1	04/14/16 14:18	msh
Copper, total (3050)	M6020 ICP-MS	505	18.9			mg/Kg	0.3	1	04/14/16 14:18	msh
Iron, total (3050)	M6010B ICP	101	18500		*	mg/Kg	2	5	04/08/16 14:57	gss
Lead, total (3050)	M6020 ICP-MS	505	72.30		*	mg/Kg	0.05	0.3	04/14/16 14:18	msh
Magnesium, total (3050)	M6010B ICP	101	1930		*	mg/Kg	20	100	04/08/16 14:57	gss
Manganese, total (3050)	M6020 ICP-MS	50500	1460		*	mg/Kg	30	100	04/18/16 19:24	msh
Mercury, total	M7471A CVAA	405		U	*	mg/Kg	0.08	0.4	04/11/16 13:15	mfm
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	04/08/16 14:57	gss
Nickel, total (3050)	M6020 ICP-MS	505	4.5			mg/Kg	0.3	2	04/14/16 14:18	msh
Potassium, total (3050)	M6010B ICP	101	1900			mg/Kg	20	100	04/08/16 14:57	gss
Selenium, total (3050)	M6020 ICP-MS	505	0.40			mg/Kg	0.05	0.1	04/14/16 14:18	msh
Silver, total (3050)	M6020 ICP-MS	505	3.13			mg/Kg	0.03	0.1	04/14/16 14:18	msh
Zinc, total (3050)	M6020 ICP-MS	505	175		*	mg/Kg	1	3	04/14/16 14:18	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	47.2		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:38	rbt
Digestion - Hot Plate	M3050B ICP								04/07/16 19:47	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 19:47	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:37	rbt

Tahoe Resources, Inc.Project ID: Escobal
Sample ID: SED-4AACZ Sample ID: **L29653-06**
Date Sampled: 03/16/16 11:00
Date Received: 03/30/16
Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	35.7		UH	*	mg/Kg	0.2	0.7	03/31/16 14:42	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	240	0.0436		*	%	0.0048	0.012	04/01/16 23:34	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-5

ACZ Sample ID: **L29653-07**
Date Sampled: 03/14/16 08:15
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 9:46	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/01/16 10:42	spl

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50500	8770		*	mg/Kg	50	300	04/18/16 19:26	msh
Antimony, total (3050)	M6020 ICP-MS	505	0.6	B	*	mg/Kg	0.2	1	04/14/16 14:22	msh
Arsenic, total (3050)	M6020 ICP-MS	505	10.3			mg/Kg	0.1	0.5	04/14/16 14:22	msh
Barium, total (3050)	M6020 ICP-MS	505	227		*	mg/Kg	0.3	1	04/14/16 14:22	msh
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	04/08/16 15:00	gss
Cadmium, total (3050)	M6020 ICP-MS	505	0.36		*	mg/Kg	0.05	0.3	04/14/16 14:22	msh
Calcium, total (3050)	M6010B ICP	101	1240			mg/Kg	10	50	04/08/16 15:00	gss
Chromium, total (3050)	M6020 ICP-MS	505	6.2			mg/Kg	0.3	1	04/14/16 14:22	msh
Copper, total (3050)	M6020 ICP-MS	505	5.2			mg/Kg	0.3	1	04/14/16 14:22	msh
Iron, total (3050)	M6010B ICP	101	22700		*	mg/Kg	2	5	04/08/16 15:00	gss
Lead, total (3050)	M6020 ICP-MS	505	7.70		*	mg/Kg	0.05	0.3	04/14/16 14:22	msh
Magnesium, total (3050)	M6010B ICP	101	790		*	mg/Kg	20	100	04/08/16 15:00	gss
Manganese, total (3050)	M6020 ICP-MS	505	553		*	mg/Kg	0.3	1	04/14/16 14:22	msh
Mercury, total	M7471A CVAA	292	0.10	B	*	mg/Kg	0.06	0.3	04/11/16 13:18	mfm
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	04/08/16 15:00	gss
Nickel, total (3050)	M6020 ICP-MS	505	2.2			mg/Kg	0.3	2	04/14/16 14:22	msh
Potassium, total (3050)	M6010B ICP	101	1420			mg/Kg	20	100	04/08/16 15:00	gss
Selenium, total (3050)	M6020 ICP-MS	505	0.07	B		mg/Kg	0.05	0.1	04/14/16 14:22	msh
Silver, total (3050)	M6020 ICP-MS	505	0.06	B		mg/Kg	0.03	0.1	04/14/16 14:22	msh
Zinc, total (3050)	M6020 ICP-MS	505	45		*	mg/Kg	1	3	04/14/16 14:22	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	57.2		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:40	rbt
Digestion - Hot Plate	M3050B ICP								04/07/16 20:45	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 20:45	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:43	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-5

ACZ Sample ID: **L29653-07**

Date Sampled: 03/14/16 08:15

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	39.8		UH	*	mg/Kg	0.2	0.8	03/31/16 14:45	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	66	0.0167		*	%	0.00132	0.0033	04/01/16 23:13	pjb

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-6

ACZ Sample ID: **L29653-08**

Date Sampled: 03/16/16 08:25

Date Received: 03/30/16

Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 9:57	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/07/16 12:30	mss2

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50000	5400		*	mg/Kg	50	300	04/18/16 19:33	msh
Antimony, total (3050)	M6020 ICP-MS	500	0.6	B	*	mg/Kg	0.2	1	04/14/16 14:31	msh
Arsenic, total (3050)	M6020 ICP-MS	500	11			mg/Kg	0.1	0.5	04/14/16 14:31	msh
Barium, total (3050)	M6020 ICP-MS	500	78		*	mg/Kg	0.3	1	04/14/16 14:31	msh
Boron, total (3050)	M6010B ICP	100	1	B		mg/Kg	1	5	04/08/16 15:06	gss
Cadmium, total (3050)	M6020 ICP-MS	500	0.19	B	*	mg/Kg	0.05	0.3	04/14/16 14:31	msh
Calcium, total (3050)	M6010B ICP	100	1080			mg/Kg	10	50	04/08/16 15:06	gss
Chromium, total (3050)	M6020 ICP-MS	500	2.9			mg/Kg	0.3	1	04/14/16 14:31	msh
Copper, total (3050)	M6020 ICP-MS	500	4.3			mg/Kg	0.3	1	04/14/16 14:31	msh
Iron, total (3050)	M6010B ICP	100	8600		*	mg/Kg	2	5	04/08/16 15:06	gss
Lead, total (3050)	M6020 ICP-MS	500	4.38		*	mg/Kg	0.05	0.3	04/14/16 14:31	msh
Magnesium, total (3050)	M6010B ICP	100	720		*	mg/Kg	20	100	04/08/16 15:06	gss
Manganese, total (3050)	M6020 ICP-MS	500	291		*	mg/Kg	0.3	1	04/14/16 14:31	msh
Mercury, total	M7471A CVAA	247		U	*	mg/Kg	0.05	0.2	04/11/16 13:20	mfm
Molybdenum, total (3050)	M6010B ICP	100		U		mg/Kg	2	10	04/08/16 15:06	gss
Nickel, total (3050)	M6020 ICP-MS	500	1.2	B		mg/Kg	0.3	2	04/14/16 14:31	msh
Potassium, total (3050)	M6010B ICP	100	1210			mg/Kg	20	100	04/08/16 15:06	gss
Selenium, total (3050)	M6020 ICP-MS	500	0.17			mg/Kg	0.05	0.1	04/14/16 14:31	msh
Silver, total (3050)	M6020 ICP-MS	500	0.04	B		mg/Kg	0.03	0.1	04/14/16 14:31	msh
Zinc, total (3050)	M6020 ICP-MS	500	17		*	mg/Kg	1	3	04/14/16 14:31	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	71.1		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:41	rbt
Digestion - Hot Plate	M3050B ICP								04/07/16 23:41	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/07/16 23:41	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:48	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-6

ACZ Sample ID: **L29653-08**

Date Sampled: 03/16/16 08:25

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	34		UH	*	mg/Kg	0.2	0.7	03/31/16 15:00	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	158	0.00923		*	%	0.00158	0.0079	04/12/16 15:44	spl

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-8

ACZ Sample ID: **L29653-09**
Date Sampled: 03/16/16 10:15
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 10:09	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/07/16 13:45	mss2

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50500	7980		*	mg/Kg	50	300	04/18/16 19:35	msh
Antimony, total (3050)	M6020 ICP-MS	505	0.4	B	*	mg/Kg	0.2	1	04/14/16 14:34	msh
Arsenic, total (3050)	M6020 ICP-MS	505	8.6			mg/Kg	0.1	0.5	04/14/16 14:34	msh
Barium, total (3050)	M6020 ICP-MS	505	95.4		*	mg/Kg	0.3	1	04/14/16 14:34	msh
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	04/08/16 15:09	gss
Cadmium, total (3050)	M6020 ICP-MS	505	0.37		*	mg/Kg	0.05	0.3	04/14/16 14:34	msh
Calcium, total (3050)	M6010B ICP	101	1840			mg/Kg	10	50	04/08/16 15:09	gss
Chromium, total (3050)	M6020 ICP-MS	505	2.5			mg/Kg	0.3	1	04/14/16 14:34	msh
Copper, total (3050)	M6020 ICP-MS	505	8.9			mg/Kg	0.3	1	04/14/16 14:34	msh
Iron, total (3050)	M6010B ICP	101	9250		*	mg/Kg	2	5	04/08/16 15:09	gss
Lead, total (3050)	M6020 ICP-MS	505	10.40		*	mg/Kg	0.05	0.3	04/14/16 14:34	msh
Magnesium, total (3050)	M6010B ICP	101	650		*	mg/Kg	20	100	04/08/16 15:09	gss
Manganese, total (3050)	M6020 ICP-MS	505	342		*	mg/Kg	0.3	1	04/14/16 14:34	msh
Mercury, total	M7471A CVAA	283		U	*	mg/Kg	0.06	0.3	04/11/16 13:22	mfm
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	04/08/16 15:09	gss
Nickel, total (3050)	M6020 ICP-MS	505	1.3	B		mg/Kg	0.3	2	04/14/16 14:34	msh
Potassium, total (3050)	M6010B ICP	101	1570			mg/Kg	20	100	04/08/16 15:09	gss
Selenium, total (3050)	M6020 ICP-MS	505	0.11			mg/Kg	0.05	0.1	04/14/16 14:34	msh
Silver, total (3050)	M6020 ICP-MS	505	0.19			mg/Kg	0.03	0.1	04/14/16 14:34	msh
Zinc, total (3050)	M6020 ICP-MS	505	63		*	mg/Kg	1	3	04/14/16 14:34	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	57.2		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:43	rbt
Digestion - Hot Plate	M3050B ICP								04/08/16 0:40	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/08/16 0:40	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:54	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-8

ACZ Sample ID: **L29653-09**

Date Sampled: 03/16/16 10:15

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	34.5		UH	*	mg/Kg	0.2	0.7	03/31/16 14:46	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	353	0.0994		*	%	0.00353	0.0177	04/12/16 15:46	spl

Tahoe Resources, Inc.

Project ID: Escobal
Sample ID: SED-9

ACZ Sample ID: **L29653-10**
Date Sampled: 03/16/16 09:05
Date Received: 03/30/16
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								03/31/16 10:20	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								04/07/16 14:22	mss2

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	50500	14000		*	mg/Kg	50	300	04/18/16 19:37	msh
Antimony, total (3050)	M6020 ICP-MS	505	0.7	B	*	mg/Kg	0.2	1	04/14/16 14:37	msh
Arsenic, total (3050)	M6020 ICP-MS	505	9.1			mg/Kg	0.1	0.5	04/14/16 14:37	msh
Barium, total (3050)	M6020 ICP-MS	505	182		*	mg/Kg	0.3	1	04/14/16 14:37	msh
Boron, total (3050)	M6010B ICP	101	2	B		mg/Kg	1	5	04/08/16 15:12	gss
Cadmium, total (3050)	M6020 ICP-MS	505	0.61		*	mg/Kg	0.05	0.3	04/14/16 14:37	msh
Calcium, total (3050)	M6010B ICP	101	2290			mg/Kg	10	50	04/08/16 15:12	gss
Chromium, total (3050)	M6020 ICP-MS	505	5.3			mg/Kg	0.3	1	04/14/16 14:37	msh
Copper, total (3050)	M6020 ICP-MS	505	16.3			mg/Kg	0.3	1	04/14/16 14:37	msh
Iron, total (3050)	M6010B ICP	101	14000		*	mg/Kg	2	5	04/08/16 15:12	gss
Lead, total (3050)	M6020 ICP-MS	505	17.90		*	mg/Kg	0.05	0.3	04/14/16 14:37	msh
Magnesium, total (3050)	M6010B ICP	101	1430		*	mg/Kg	20	100	04/08/16 15:12	gss
Manganese, total (3050)	M6020 ICP-MS	50500	1110		*	mg/Kg	30	100	04/18/16 19:37	msh
Mercury, total	M7471A CVAA	186		U	*	mg/Kg	0.04	0.2	04/11/16 13:24	mfm
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	04/08/16 15:12	gss
Nickel, total (3050)	M6020 ICP-MS	505	3.4			mg/Kg	0.3	2	04/14/16 14:37	msh
Potassium, total (3050)	M6010B ICP	101	1480			mg/Kg	20	100	04/08/16 15:12	gss
Selenium, total (3050)	M6020 ICP-MS	505	0.26			mg/Kg	0.05	0.1	04/14/16 14:37	msh
Silver, total (3050)	M6020 ICP-MS	505	0.28			mg/Kg	0.03	0.1	04/14/16 14:37	msh
Zinc, total (3050)	M6020 ICP-MS	505	101		*	mg/Kg	1	3	04/14/16 14:37	msh

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	82.1		*	%	0.1	0.5	03/31/16 13:20	rbt

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								03/31/16 10:45	rbt
Digestion - Hot Plate	M3050B ICP								04/08/16 1:39	bcc
Digestion - Hot Plate	M3050B ICP-MS								04/08/16 1:39	bcc
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								04/06/16 9:59	rbt

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: SED-9

ACZ Sample ID: **L29653-10**

Date Sampled: 03/16/16 09:05

Date Received: 03/30/16

Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	27.1		UH	*	mg/Kg	0.2	0.5	03/31/16 14:47	enb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	66.1	0.0274		*	%	0.00066	0.00331	04/12/16 15:47	spl



Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-01	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401296	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA M7471A CVAA	N1	See Case Narrative.
	WG401296	Zinc, total (3050)	M6020 ICP-MS	Q6	Sample was received above recommended temperature.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
			M9012B - Automated Colorimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-02	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401585	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA M7471A CVAA	N1 Q6	See Case Narrative. Sample was received above recommended temperature.
	WG401296	Zinc, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-03	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401585	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA M7471A CVAA	N1 Q6	See Case Narrative. Sample was received above recommended temperature.
	WG401296	Zinc, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H1	Sample prep or analysis performed past holding time. See case narrative.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-04	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401296	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA	N1	See Case Narrative.
	WG401296	Zinc, total (3050)	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H1	Sample prep or analysis performed past holding time. See case narrative.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-05	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401585	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA M7471A CVAA	N1 Q6	See Case Narrative. Sample was received above recommended temperature.
	WG401296	Zinc, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-06	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401585	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA M7471A CVAA	N1 Q6	See Case Narrative. Sample was received above recommended temperature.
	WG401296	Zinc, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H1	Sample prep or analysis performed past holding time. See case narrative.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-07	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401296	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA M7471A CVAA	N1 Q6	See Case Narrative. Sample was received above recommended temperature.
	WG401296	Zinc, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M9012B - Automated Colorimetric	Q6	Sample was received above recommended temperature.
			M9012B - Automated Colorimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG400902	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-08	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401296	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA	N1	See Case Narrative.
	WG401296	Zinc, total (3050)	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H1	Sample prep or analysis performed past holding time. See case narrative.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
M9012B - Automated Colorimetric			Q6	Sample was received above recommended temperature.	
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-09	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401296	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA	N1	See Case Narrative.
	WG401296	Zinc, total (3050)	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H1	Sample prep or analysis performed past holding time. See case narrative.
			M9012B - Automated Colorimetric	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
M9012B - Automated Colorimetric			Q6	Sample was received above recommended temperature.	
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29653-10	WG401585	Aluminum, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
		Barium, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
		Cadmium, total (3050)	M6020 ICP-MS	ZB	The ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 100 times the MDL.
	WG401160	Iron, total (3050)	M6010B ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG401296	Lead, total (3050)	M6020 ICP-MS	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401160	Magnesium, total (3050)	M6010B ICP	ZG	The ICP Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG401585	Manganese, total (3050)	M6020 ICP-MS	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The recovery of the associated control sample (LCS or LFB) was acceptable.
			M6020 ICP-MS	RD	For a solid matrix, the duplicate RPD (spike or matrix) exceeded the control limit, which is attributable to the non-homogeneity of the sample.
	WG401152	Mercury, total	M7471A CVAA	N1	See Case Narrative.
	WG401296	Zinc, total (3050)	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG400831	Cyanide, total	M9012B - Automated Colorimetric	H1	Sample prep or analysis performed past holding time. See case narrative.
M9012B - Automated Colorimetric			M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.	
M9012B - Automated Colorimetric			Q6	Sample was received above recommended temperature.	
M9012B - Automated Colorimetric			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	

Tahoe Resources, Inc.

ACZ Project ID: **L29653**

Soil Analysis

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Solids, Percent	D2216-80
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Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)
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Tahoe Resources, Inc.
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ACZ Project ID: L29653
 Date Received: 03/30/2016 09:55
 Received By: ddp
 Date Printed: 3/30/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?	X		
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples? A change was made in the Received By Date:Time section prior to ACZ custody.	X		

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time? Some parameters were received past hold time.		X	

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
NA23617	10.4	<=6.0	14	N/A

Was ice present in the shipment container(s)?

No - Wet or gel ice was not present in the shipment container(s).

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29653
Date Received: 03/30/2016 09:55
Received By: ddp
Date Printed: 3/30/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

29653

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza
 Company: Tabor Resources Inc
 E-mail: M.Berganza @ sarrafaer.com.gt

Address: Bulevar los Proceres 18 calle 24-69 zona 10
Empresarial, Zona Pradera, Torre III Oficina 1402
 Telephone: (502) 59 51 5248

Copy of Report to:

Name: _____
 Company: _____

E-mail: _____
 Telephone: _____

Invoice to:

Name: Miguel Berganza
 Company: Tabor Resources Inc
 E-mail: M.Berganza @ sarrafaer.com.gt

Address: _____
 Telephone: _____

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State _____ Zip code _____ Time Zone _____

*Sampler's Signature: [Signature] I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: Water quality
 PO#: Csroba1
 Reporting state for compliance testing: _____
 Check box if samples include NRC licensed material?

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	ANALYSES REQUESTED														
				Sed														
Sed-1	14/03/16 09:55	SO	1	/														
Sed-2	14/03/16 08:55	SO	1	/														
Sed-2A	16/03/16 11:35	SO	1	/														
Sed-3	16/03/16 11:10	SO	1	/														
Sed-4	14/03/16 08:15	SO	1	/														
Sed-4A	16/03/16 11:00	SO	1	/														
Sed-5	14/03/16 08:15	SO	1	/														
Sed-6	16/03/16 08:25	SO	1	/														
Sed-8	16/03/16 10:15	SO	1	/														
Sed-9	16/03/16 09:05	SO	1	/														

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
<u>[Signature]</u>	<u>28-03-2016</u> <u>15:05</u>	<u>[Signature]</u>	<u>28-3-16</u> <u>15:05</u>

29653 Chain of Custody



Guatemala March 28th 2016

QUARANTINE STATEMENT

To whom it may concern:

Minera San Rafael, S.A is sending a case with samples of sediments, which requires quarantine documentation and USDA due its organic content. These samples will be analyzed by ACZ Laboratories Inc. in Steamboat Springs, Colorado, USA.

If you have any question or doubt, please contact Miguel Berganza at Minera San Rafael, S.A. (502-5951-5248) or Sue Webber at ACZ Laboratories (970-879-6590).

Sincerely yours,

Miguel Berganza
Environment Department
Mina El Escobal
Minera San Rafael, S.A

United States Department of Agriculture
Animal and Plant Health Inspection Service
4700 River Road
Riverdale, MD 20737

Permit to Receive Soil
Regulated by 7 CFR 330

This permit was generated electronically via the ePermits system.

PERMITTEE NAME:	Brett Dalke	PERMIT NUMBER:	P330-15-00088
COMPANY:	ACZ Labs	APPLICATION NUMBER:	P525-141027-003
RECEIVING ADDRESS:	2773 Downhill Drive Steamboat Springs, CO 80487	DATE ISSUED:	03/30/2015
MAILING ADDRESS:	2773 Downhill Drive Steamboat Springs, CO 80487		
PHONE:	(970) 879-6590 Ext. 611	EXPIRES:	03/30/2018
FAX:			


PORTS OF ARRIVAL/PLANT INSPECTION STATIONS: AK, Anchorage; AL, Huntsville; AL, Mobile; AZ, Douglas; AZ, Lukeville; AZ, Naco; AZ, Nogales; AZ, Phoenix; AZ, San Luis; AZ, Tucson; CA, Calexico; CA, El Segundo; CA, Fresno; CA, Long Beach; CA, Oakland; CA, Ontario; CA, Otay Mesa; CA, Port Hueneme; CA, Sacramento; CA, San Diego; CA, San Francisco; CA, San Jose; CA, San Ysidro; CA, Tecate; CO, Denver; CT, Hartford; CT, New Haven; DE, Dover; DE, Wilmington; FL, Ft. Lauderdale; FL, Ft. Myers; FL, Ft. Pierce; FL, Jacksonville; FL, Key West; FL, Miami; FL, Orlando; FL, Pensacola; FL, Port Canaveral; FL, Port Everglades; FL, Sanford; FL, Tampa; FL, West Palm Beach; GA, Atlanta; GA, Savannah; GU, Agana; HI, Hilo; HI, Honolulu; HI, Kahului; HI, Kailua-Kona; HI, Lihue; ID, Eastport; IL, Chicago; IN, Indianapolis; KY, Louisville; MA, South Boston; MD, Baltimore; MD, Beltsville; ME, Bangor; ME, Calais; ME, Houlton; ME, Portland; MI, Detroit; MI, Port Huron; MI, Romulus; MI, Sault Saint Marie; MN, Duluth; MN, Grand Portage; MN, International Falls; MN, Minneapolis; MO, Kansas City; MO, St. Louis; MP, Commonwealth of the Northern Mariana Islands; MS, Gulfport; MS, Port Bienville; MT, Raymond; MT, Roosville; MT, Sweetgrass; NC, Raleigh; NC, Wilmington; ND, Dunseith; ND, Pembina; ND, Portal; NJ, Linden; NJ, Newark; NM, Albuquerque; NM, Columbus; NM, SantaTeresa; NV, Las Vegas; NY, Albany; NY, Alexandria Bay; NY, Brooklyn; NY, Buffalo; NY, Champlain, Rouses Point; NY, Jamaica; NY, Jamaica; NY, Newburgh; OH, Ashtabula; OH, Cincinnati; OH, Cleveland; OH, Columbus; OH, Toledo; OH, Wilmington; OK, Oklahoma City; OR, Portland; PA, Allentown; PA, Harrisburg; PA, Philadelphia; PA, Pittsburgh; PA, Scranton; PR, Aguadilla; PR, Carolina; PR, Fajardo; PR, Mayaguez; PR, Ponce; RI, Warwick/Providence; SC, Charleston; TN, Memphis; TN, Nashville; TX, Austin; TX, Brownsville; TX, Corpus Christi; TX, Dallas; TX, Del Rio; TX, Eagle Pass; TX, El Paso; TX, Fabens; TX, Falcon; TX, Fort Hancock; TX, Galveston; TX, Hidalgo; TX, Humble; TX, Laredo; TX, Los Indios; TX, Pharr; TX, Port Arthur; TX, Presidio; TX, Progresso; TX, Rio Grande City; TX, Roma; TX, San Antonio; TX, Victoria; UT, Salt Lake City; VA, Dulles; VA, Norfolk; VI, St. Croix; VI, St. Thomas; VT, Berlin; WA, Blaine; WA, Oroville; WA, Port Angeles; WA, SeaTac; WA, Sumas; WI, Green Bay; WI, Milwaukee

HAND CARRY: No

Under the conditions specified, this permit authorizes the following:
Quantity of Soil per Shipment and Treatment
Over 3 lbs - Your facility MUST be inspected and approved to receive this soil

SPECIAL INSTRUCTIONS TO INSPECTORS
See permit conditions below

Permit Number P330-15-00088

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.  Mark A. Stull	DATE 03/30/2015
--	------------------------

WARNING: Any alteration, forgery, or unauthorized use of this Federal Form is subject to civil penalties of up to \$250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than \$10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

INSTRUCTIONS TO DHS CBP INSPECTORS FOR IMPORTED SOIL SHIPMENTS ROUTED TO RECEIVING FACILITY:

For hand carry of soil, an official of CBP Agricultural Programs and Trade Liaison (APTL) would have been notified to document and facilitate the entry of the soil (See hand carry conditions below if stipulated). Otherwise:

1. Validate the permit in ePermits using the CBP search feature by logging on to:
<https://epermits.aphis.usda.gov/epermits>
2. Confirm that the shipment is being routed directly to a USDA APHIS PPQ Inspected Facility authorized to receive soil by logging on to: <https://web01.aphis.usda.gov/PPQ/AuthSoilLabs.nsf/web?openform>
3. Confirm that the imported shipment has a valid USDA PPQ Form 550 Black/White label.
4. Confirm that the carrier of the shipment imported under this USDA PPQ 525 permit is commercially bonded.
5. For questions or concerns, contact the USDA APHIS PPQ Permit Unit in Riverdale, MD, at 866-524-5421 and ask to speak with a compliance officer.

PERMIT GUIDANCE

Receipt or use of foreign isolates or samples from countries under sanctions requires specific permission from the U.S. Department of Treasury (see <http://www.treasury.gov/resource-center/sanctions/Programs/Pages/Programs.aspx> for current country/regional listings) for current country listings.

This permit does not authorize importation, interstate movement, possession, and/or use of strains of genetically engineered regulated organisms (created by the use of recombinant DNA technology).

If an animal pathogen is identified in your shipment, to ensure appropriate safeguarding, please refer to http://www.aphis.usda.gov/import_export/animals/animal_import/animal_imports_anproducts.sh

tml.

If a human pathogen is identified, please see the CDC Etiologic Agent Import Permit Program at <http://www.cdc.gov/od/eaiip/>

This permit does not fulfill the requirements of other federal or state regulatory authorities. As appropriate, please contact the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Food and Drug Administration, the Centers for Disease Control and Prevention, the APHIS Veterinary Services unit, or your State's Department of Agriculture to ensure proper permitting.

If you are considering renewal of this permit, an application should be submitted at least 90 days prior to the expiration date of this permit to ensure continued coverage. Permits requiring containment facilities may take a longer period of time to process.


This permit authorizes the importation of soil from all foreign sources (except countries with sanctions or embargoes by U.S. State Department) only for chemical/ physical analysis in a controlled laboratory environment at the named facility on the permit.

PERMIT CONDITIONS

This permit authorizes the importation of soil from all foreign sources (except countries with sanctions or embargoes by U.S. State Department), and interstate/ domestic movement of soil from Hawaii, the contiguous U.S., the continental U.S., and all U.S. territories for chemical/ physical analysis including the isolation and/or culture of Deoxyribonucleic Acid (DNA) or Ribonucleic Acid (RNA) in a controlled laboratory environment at the named facility on the permit.

1. This permit is issued only for the named permit holder at the address(s) identified on this permit. This permit cannot be transferred or assigned.


Permit Number P330-15-00088

<p>THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.</p>  <p>Mark A. Stull</p>	<p>DATE</p> <p>03/30/2015</p>
--	-------------------------------

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to \$230,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than \$10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

2. The permit holder verifies United States residency by initialing and accepting these permit conditions. If you are not a United States resident, it is unlawful for you to initial or accept these permit conditions because a USDA 525 soil Permit can only be issued to United States residents.
3. The permit holder is solely responsible for ensuring compliance with all statutory requirements and specifically listed permit conditions. Failure to comply with the terms and conditions of this permit is cause for the following: (a) cancellation of this permit, (b) cancellation of other permits issued to the permit holder, (c) seizure and/or destruction of regulated organisms, (d) denial of future permit applications by this permit holder, (e) liability for civil penalties, and (f) criminal prosecution under provisions in the Plant Protection Act.
4. Any alteration, forgery, unauthorized use of this permit and/or associated Federal Forms are subject to civil and criminal penalties including fines and imprisonment.
5. This permit must not be used for the movement or use of plant pathogens listed in the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. If any organism listed as a Select Agent is identified from materials associated with this research, the permit holder is required to notify APHIS, Agricultural Select Agent Program (ASAP) within one business day by phone at 301-851-3300, and within seven (7) days submit APHIS/CDC Form 4 (Report of Identification of a Select Agent or Toxin in a Clinical or Diagnostic Laboratory) to APHIS, ASAP; 4700 River Rd, Unit 2, Riverdale, MD 20737 (see instructions at: http://www.aphis.usda.gov/programs/ag_selectagent/index.shtml). Failure to comply with this requirement is a violation of the Agricultural Bioterrorism Protection Act of 2002.
6. If a regulated organism is received in this shipment, the permit holder must take all prudent measures to contain the organism(s) and notify the permit unit within one business day by calling 866-524-5421 or by e-mail to pest.permits@aphis.usda.gov. The permit holder must immediately notify the permit unit of the destruction of regulated organisms received under this permit, as above. Similarly, the permit holder must immediately notify the permit unit if facilities are destroyed or decommissioned for any reason.
7. You as the permit holder are responsible for maintaining a valid permit for as long as the soil is in your possession. APHIS does not issue extensions or renewals of existing permits; the permit holder must submit a new permit application at least three months prior to the expiration of this permit, and obtain a new permit to continue uninterrupted authorization for the soil approved under this permit.
8. If an accidental release into the environment occurs, notification must be made within one business day to APHIS, PPQ, 4700 River Rd., unit 133; Riverdale, MD 20737; 866-524-5421. A written report of the incident must be submitted identifying: (a) the name of the permit holder (responsible person), (b) the permit number, (c) the country or State of origin of the soil, (d) the nature of the release, and (e) measures already taken to contain, reduce or limit the effects of the accidentally released soil. Any plans prepared to contain, reduce or limit the effects of the accidentally released soil may be submitted as developed.
9. Without prior notice and during reasonable hours, authorized PPQ and/or State regulatory officials shall be allowed to inspect the conditions associated with the regulated soil authorized under this permit.
10. The permit holder must maintain an official permanent work assignment at the address identified on this permit. If the permit holder ceases assignment/affiliation at the address identified on this permit, or personnel circumstances change in any way, then a compliance officer must be notified at the PPQ permit unit immediately (that is, within one business day) by either (a) email to pest.permits@aphis.usda.gov, (b) fax to 301-734-4300 or 8700/5392, or (c) conventional mail to USDA PPQ Permit Unit, 4700 River Road, Riverdale, MD 20737. Should the permit holder depart from the organization/facility, the permit holder must either (a) request cancellation of this permit and comply with all permit-specific termination conditions, (b) apply for and receive a permit to move the soil to a new facility, or (c) relinquish control of the regulated soil to a qualified individual who obtained a permit for the continued use of this regulated soil prior to this permit holder's departure.
11. A copy of this permit must accompany all shipments authorized under this permit.
12. CBP-AI and PPQ have the authority to order and approve treatment, re-exportation or destruction of a shipment, a portion of a shipment or any other material associated with the shipment (i.e. pallets, packaging, and means of conveyance). If an official of CBP-AI or PPQ determines that the shipment requires treatment as a condition of entry, is contaminated with a quarantine plant pest or pests, is commingled with prohibited plant material or the required documentation is incomplete or missing, then that official may order and approve treatment, re-exportation or destruction of a shipment, a portion of a shipment or any other material associated with the shipment (i.e. pallets,

Permit Number P330-15-00088

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 Mark A. Stull	03/30/2015

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packaging, means of conveyance).

13. All solid wood packing material (SWPM) accompanying the shipment must be in compliance with ISPM 15 treatment regulations and IPPC stamp requirements and enforcement. Noncompliant shipments will be treated, re-exported or destroyed at the consignee's expense.
14. All costs and arrangements for safeguarding and transportation of the cargo are the responsibility of the importer, broker or other parties associated with the shipment.
15. All operations must be consistent with information submitted in association with the above listed APHIS-PPQ inspected facility and subject to the conditions below.
16. Soil must be shipped in a securely closed, watertight container (primary container, test tube, vial, etc.) which must be enclosed in a second, durable watertight container (secondary container).
17. The shipment must be free from foreign matter or debris, plants and plant parts including noxious weeds and infestations by other macroorganisms such as insects, Cyst nematodes, mollusks and acari. Authorized material found to be commingled with unauthorized material will be subject to the same action (i.e. re-export, destruction) as unauthorized material.
18. The imported article can be released without treatment at the port of entry to the permittee's address listed on the permit or label or to an authorized user only if the final destination is an approved facility listed at <https://web01.aphis.usda.gov/PPQ/AuthSoilLabs.nsf/web?openform>.
19. The soil must not be used in field research or release into the environment before sterilization.

The soil must not be used for isolation or culture of organisms, or for extracting and concentrating organisms from the soil.


The soil must not be used as a growing medium.

20. Further distribution of soil is not allowed without prior approval from Federal officials [State Plant Health Director or designee] (or from Federal officials with State concurrence): Access the website at <http://www.aphis.usda.gov/ppq/sphd/> for a list of State Plant Health Offices. Access the website at <http://nationalplantboard.org/member/index.html> for a list of State Plant Regulatory Officials.
21. While in storage, all soil must be kept locked (e.g. in freezer, cabinet) in the approved lab with access limited to authorized personnel or they will be in a restricted access building that requires a key card entry and access is restricted to authorized personnel only; or it must be in locked room restricted to authorized personnel only.
22. The soil must be handled as quarantined material until sterilized. This will include keeping the soil enclosed in containers when not in use and labeling all containers and/or storage areas: "Quarantine Soil- Sterilize Before Disposal"
23. All packing material, media, substrate, and shipping containers must be sterilized or destroyed as approved and prescribed by the permit conditions after removing the soil.
24. All unconsumed soil, containers and effluent must be autoclaved, incinerated or properly sterilized by the permittee at the conclusion of the project as approved and prescribed by the permit conditions.
25. Any water residues (effluent) from the processing of soil samples must be treated by an approved sterilization procedure such as hydroclave or autoclave.
26. All soil residues must be dry-heated, incinerated or autoclaved.

Dry Heat Treatment: use one of the following schedules:

- 110- 120.5 degrees C (230-249 F) for 16 hours
- 121-154 degrees C (250-309 F) for 2 hours
- 154.4 - 192.5 degrees C (310-379 F) for 30 minutes
- 193-220 degrees C (380-429 F) for 4 minutes
- 221-232 degrees C (430-450) for 2 minutes

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Time starts when the entire sample reaches the required temperature, and a suitable temperature probe must be used for verification.

Autoclave soil and other material using the following conditions:

- a. Soil must be autoclaved at 121 degrees Centigrade (250 degrees Fahrenheit) for a minimum of 30 minutes at 15 psi.
- b. Autoclave tape or other indicators must be placed on each bag or sharps container prior to treatment. The autoclave tape or other indicator on each container must be checked to verify color change before disposal.
- c. The autoclave log must be completed by each user for each autoclave cycle. All parameters must be noted as listed on the log for each autoclave load.
- d. If the autoclave does not attain the minimum time and/or temperature or the autoclave tape does not change color, a notation must be made in the comment section of the autoclave log. The load must then be re-autoclaved after placing new tape on the material. If minimum time and temperature is not attained on the second cycle, users must contact the person responsible for maintaining the unit to initiate repairs. Waste must then be treated at an alternate autoclave facility that is approved by USDA.
- e. Thermometers on the autoclave must be calibrated annually, and a written record must be maintained. This must be done by an authorized autoclave service company during routine servicing.
- f. Every 6 months, you should use a commercially available test indicator kit that uses bacterial spores *Bacillus stearothermophilus* that are rendered unviable at 250 degrees F or 121 degrees C. For the test, ampules of *B. stearothermophilus* are autoclaved along with a load of waste. Upon completion of the cycle, the ampules are incubated for 48 hours and then observed for any sign of growth, which indicates insufficient sterilization. If any growth is observed, you must have the autoclave serviced and retested.

Incineration:

With the exception of metal and glass containers, all regulated and associated material must be reduced completely to ash at the end of the incineration cycle.

27. Equipment and supplies used to conduct operations or that have contacted the soil must be decontaminated using one of the following methods:


- (a) Material can be soaked in a fresh bleach solution of 10 percent (1:10) for at least 30 minutes. (1:10 is a convention that means 1 in 10 or 1 part 9 parts = 10 parts total, which is a 10 percent solution)
- (b) Material can be soaked in 70 percent ethanol
- (c) Flamed with ethanol
- (d) Treated with quaternary ammonium compounds.

Note also that autoclaving, hydroclave, incineration, and dry heat sterilization are also acceptable sterilization/decontamination methods.

28. Upon issuance of this permit (i.e., a signed PPQ 525), you will need to request the PPQ Form 550 Black/White labels at least 5 days in advance. If you applied online using ePermits, you may request the labels using the My Shipments/Labels feature. Otherwise, send your request to BlackWhiteGreenYellowlabelrequest@aphis.usda.gov. All email requests must come from the permit holder or appointee, if requested by the appointee the permit holder must be Ccd on all requests. Specify the approved port as listed on the permit and the total number of labels needed in multiples of four. You may request additional labels the same way. We will send you the labels by email as a pdf.

A label must be attached with clear tape to the exterior of each package being imported under this permit. The labels will include detailed shipping instructions. You are responsible for instructing your shipper to carefully follow these instructions. You are responsible for each import shipping label issued under this permit. All labels must be printed in color. Failure to do so may result in refused entry or destruction of your package.

Permit Number P330-15-00088

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 Mark A. Stull	03/30/2015

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Enclose the following supplemental information in each shipment:

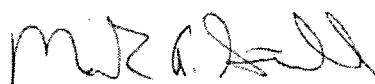
- Permittee Name
- Permit number
- Label number

Underlying packaging/wrapping must carry the address, billing, and any other information required to direct the shipment to its final destination (i.e., the permit holder's address; N.B., USDA APHIS does not defray any additional shipping costs incurred for transiting the shipment through an inspection station as the initial US destination).

29. Underlying packaging/wrapping must carry the address, billing, and any other information required to direct the shipment to its final destination (i.e., the permit holder's address; Please note: USDA APHIS does not defray any additional shipping costs incurred for transiting the shipment through an inspection station as the initial US destination).

END OF PERMIT CONDITIONS

Permit Number P330-15-00088

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.  Mark A. Stull	DATE 03/30/2015
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11.7 Informes originales de los Resultados Analíticos obtenidos del Efluente en los meses de Mayo a Julio 2016

REG 016 Resultados de Análisis

Muestra: 1 muestra de agua compuesta (según información del cliente)

Alicuota 1: 03:00 horas

Alicuota 2: 06:00horas

Alicuota 3: 09:00 horas

Alicuota 4: 12:00 horas

Análisis solicitado por: Ing. Miguel Berganza

Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa

Procedencia de la muestra: Proyecto Escobal

Fecha de muestreo: 290216

Fecha de ingreso de muestra: 290216

Fecha de análisis: 290216-090316

Fecha del informe: 090316

Identificación de la muestra: WW9

Correlativo Ecosistemas: 3992

Límites Máximos Permisibles Entes
Generadores Nuevos
Acuerdo 236-2006

Acuerdo Gubernativo 236-2006 (excepto cianuros)

PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Potencial de Hidrogeno pH (Laboratorio)	unidades	1	7.39	SMWW 4500H-B	6 a 9
* Aceites y Grasas	mg/l	5	N.D.	EPA 1664	10
Materia Flotante	---	---	ausente***	Visual	ausente
Demanda Bioquímica de Oxígeno DBO ₅	mg/l	10	< 10	Oxitop-Merck Análogo SMWW 5210D	ver nota
* Demanda Química de Oxígeno DQO	mg/l	25	< 25	Reflujo Cerrado, Merck, análogo SMWW 5220D	no especificado
Relación DBO ₅ /DQO	---	---	---	---	---
Relación DQO/DBO ₅	---	---	---	---	---
* Sólidos Suspendidos	mg/l	10	< 10	SMWW 2540D	100
* Sólidos Sedimentables	ml/l	0.1	< 0.1	SMWW 2540F	no especificado
Nitrógeno Total	mg/l	10	N.D.	Digestión alcalina persulfato colorimétrico HACH	20
Fósforo Total	mg/l	0.05	N.D.	Spectroquant Merck Análogo EPA 365.2+3, SMWW 4500-P E, ISO 6978/1, DIN EN 1189 D11	10
* Arsénico As	mg/l	0.002	0.007	UNICAM AN40177_E10/03C	0.1
* Cadmio Cd	mg/l	0.02	N.D.	SMWW 3111B	0.1
* Cobre Cu	mg/l	0.03	N.D.	SMWW 3111B	3
Cromo Hexavalente Cr(VI)	mg/l	0.05	N.D.	Colorimétrico Merck, análogo SMWW 3500-Cr-D	0.1
* Mercurio Hg	mg/l	0.004	N.D.	UNICAM AN40181_E10/03C	0.01
* Níquel Ni	mg/l	0.05	N.D.	SMWW 3111B	2

PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
					descarga a cuerpo receptor
* Plomo Pb	mg/l	0.05	N.D.	SMWW 3111B	0.4
* Zinc Zn	mg/l	0.01	N.D.	SMWW 3111B	10
Color Aparente	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	500
Color Real	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	
** Coliformes Fecales	NMP/100ml	2	23	NMP	< 1 x 10 ⁴

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración. pH < 2 en muestra para análisis de metales y Aceites y Grasas

Metodología: Espectrofotométricos / Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977. EPA 1664

N.D. No detectable. Debajo del límite de detección.

NMP: Número más probable

El valor DQO/DBO₅ y DBO₅/DQO no se ha determinado porque el resultado se encuentra abajo de nuestros límites de detección.

Respecto a la DBO el acuerdo 236-2006 la relaciona como "carga" junto al caudal y como meta de cumplimiento un valor de DBO de 200 mg/l (ver Acuerdo Artículo 21).

Los resultados obtenidos corresponden únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

* **Análisis acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04**

** **Análisis referido.**

*** *El resultado se basa en el análisis visual de la muestra enviada por el cliente al laboratorio.*

Comparación de descarga según información del cliente.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

Luis Fernando Fuentes Méndez
Ingeniero Químico
Colegiado 876

REG 016 Resultados de Análisis

Muestra: 1 muestra de agua
Análisis solicitado por: Ing. Miguel Berganza
Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa
Procedencia de la muestra: Proyecto Escobal
Fecha de muestreo: 290216
Fecha de ingreso de muestra: 290216
Fecha de análisis: 290216-090316
Fecha del informe: 090316

Identificación de la muestra: WW10

Correlativo Ecosistemas: 3993

Acuerdo Gubernativo 236-2006 (excepto cianuros)					Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Potencial de Hidrogeno pH (Laboratorio)	unidades	1	6.40	SMWW 4500H-B	6 a 9
* Aceites y Grasas	mg/l	5	N.D.	EPA 1664	10
Materia Flotante	---	---	ausente ***	Visual	ausente
Demanda Bioquímica de Oxígeno DBO ₅	mg/l	10	< 10	Oxitop-Merck Análogo SMWW 5210D	ver nota
* Demanda Química de Oxígeno DQO	mg/l	25	< 25	Reflujo Cerrado, Merck, análogo SMWW 5220D	no especificado
Relación DBO ₅ /DQO	---	---	---	---	---
Relación DQO/DBO ₅	---	---	---	---	---
* Sólidos Suspendidos	mg/l	10	< 10	SMWW 2540D	100
* Sólidos Sedimentables	ml/l	0.1	< 0.1	SMWW 2540F	no especificado
Nitrógeno Total	mg/l	10	N.D.	Digestión alcalina persulfato colorimétrico HACH	20
Fósforo Total	mg/l	0.05	N.D.	Spectroquant Merck Análogo EPA 365.2+3, SMWW 4500-P E, ISO 6978/1, DIN EN 1189 D11	10
* Arsénico As	mg/l	0.002	N.D.	UNICAM AN40177_E10/03C	0.1
* Cadmio Cd	mg/l	0.02	N.D.	SMWW 3111B	0.1
* Cobre Cu	mg/l	0.03	N.D.	SMWW 3111B	3
Cromo Hexavalente Cr(VI)	mg/l	0.05	N.D.	Colorimétrico Merck, análogo SMWW 3500- Cr-D	0.1
* Mercurio Hg	mg/l	0.004	N.D.	UNICAM AN40181_E10/03C	0.01
* Níquel Ni	mg/l	0.05	N.D.	SMWW 3111B	2

					Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Plomo Pb	mg/l	0.05	N.D.	SMWW 3111B	0.4
* Zinc Zn	mg/l	0.01	N.D.	SMWW 3111B	10
Color Aparente	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	500
Color Real	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	
** Coliformes Fecales	NMP/100ml	2	< 2	NMP	< 1 x 10 ⁴

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración. pH < 2 en muestra para análisis de metales y Aceites y Grasas

Metodología: Espectrofotométricos / Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977. EPA 1664

N.D. No detectable. Debajo del límite de detección.

NMP: Número más probable

El valor DQO/DBO₅ y DBO₅/DQO no se ha determinado porque el resultado se encuentra abajo de nuestros límites de detección.

Respecto a la DBO el acuerdo 236-2006 la relaciona como "carga" junto al caudal y como meta de cumplimiento

un valor de DBO de 200 mg/l (ver Acuerdo Artículo 21).

Los resultados obtenidos corresponden únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

* Análisis acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04


** Análisis referido.

*** El resultado se basa en el análisis visual de la muestra enviada por el cliente al laboratorio.

Comparación de descarga según información del cliente.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

Luis Fernando Fuentes Méndez
Ingeniero Químico
Colegiado 876

REG 016 Resultados de Análisis

Muestra: 1 muestra de agua compuesta (según información del cliente)

Alicuota 1: 03:00 horas

Alicuota 2: 06:00 horas

Alicuota 3: 09:00 horas

Alicuota 4: 12:00 horas

Análisis solicitado por: Ing. Miguel Berganza

Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa

Procedencia de la muestra: Proyecto Escobal

Fecha de muestreo: 290216

Fecha de ingreso de muestra: 290216

Fecha de análisis: 290216-090316

Fecha del informe: 090316

Identificación de la muestra: WW11

Correlativo Ecosistemas: 3994

Acuerdo Gubernativo 236-2006 (excepto cianuros)

Límites Máximos Permisibles Entes
Generadores Nuevos
Acuerdo 236-2006

PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Potencial de Hidrogeno pH (Laboratorio)	unidades	1	7.30	SMWW 4500H-B	6 a 9
* Aceites y Grasas	mg/l	5	N.D.	EPA 1664	10
Materia Flotante	---	---	ausente***	Visual	ausente
Demanda Bioquímica de Oxígeno DBO ₅	mg/l	10	< 10	Oxitop-Merck Análogo SMWW 5210D	ver nota
* Demanda Química de Oxígeno DQO	mg/l	25	< 25	Reflujo Cerrado, Merck, análogo SMWW 5220D	no especificado
Relación DBO ₅ /DQO	---	---	---	---	---
Relación DQO/DBO ₅	---	---	---	---	---
* Sólidos Suspendidos	mg/l	10	< 10	SMWW 2540D	100
* Sólidos Sedimentables	ml/l	0.1	< 0.1	SMWW 2540F	no especificado
Nitrógeno Total	mg/l	10	N.D.	Digestión alcalina persulfato colorimétrico HACH	20
Fósforo Total	mg/l	0.05	N.D.	Spectroquant Merck Análogo EPA 365.2+3, SMWW 4500-P E, ISO 6978/1, DIN EN 1189 D11	10
* Arsénico As	mg/l	0.002	0.006	UNICAM AN40177_E10/03C	0.1
* Cadmio Cd	mg/l	0.02	N.D.	SMWW 3111B	0.1
* Cobre Cu	mg/l	0.03	N.D.	SMWW 3111B	3
Cromo Hexavalente Cr(VI)	mg/l	0.05	N.D.	Colorimétrico Merck, análogo SMWW 3500-Cr-D	0.1
* Mercurio Hg	mg/l	0.004	N.D.	UNICAM AN40181_E10/03C	0.01
* Níquel Ni	mg/l	0.05	N.D.	SMWW 3111B	2

					Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Plomo Pb	mg/l	0.05	N.D.	SMWW 3111B	0.4
* Zinc Zn	mg/l	0.01	N.D.	SMWW 3111B	10
Color Aparente	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	500
Color Real	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	
** Coliformes Fecales	NMP/100ml	2	4.5	NMP	< 1 x 10 ⁴

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración. pH < 2 en muestra para análisis de metales y Aceites y Grasas

Metodología: Espectrofotométricos / Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977. EPA 1664

N.D. No detectable. Debajo del límite de detección.

NMP: Número más probable

El valor DQO/DBO₅ y DBO₅/DQO no se ha determinado porque el resultado se encuentra abajo de nuestros límites de detección.

Respecto a la DBO el acuerdo 236-2006 la relaciona como "carga" junto al caudal y como meta de cumplimiento un valor de DBO de 200 mg/l (ver Acuerdo Artículo 21).

Los resultados obtenidos corresponden únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

** Análisis acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04*

*** Análisis referido.*

**** El resultado se basa en el análisis visual de la muestra enviada por el cliente al laboratorio.*

Comparación de descarga según información del cliente.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

Luis Fernando Fuentes Méndez
Ingeniero Químico
Colegiado 876

March 14, 2016

Report to:

Miguel Berganza

Tahoe Resources, Inc.

Boulevard Los Proceres 18 c. 24-69 zona 10

Centro

Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza

Tahoe Resources, Inc.

Boulevard Los Proceres 18 c. 24-69 zona 10

Centro

Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29204

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 02, 2016. This project has been assigned to ACZ's project number, L29204. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29204. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

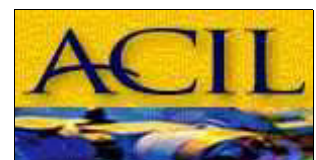
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 13, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: WW9

ACZ Sample ID: **L29204-01**
 Date Sampled: 02/29/16 12:00
 Date Received: 03/02/16
 Sample Matrix: Waste Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 10:09	krh

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:52	pjb

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: WW10

ACZ Sample ID: **L29204-02**

Date Sampled: 02/29/16 12:00

Date Received: 03/02/16

Sample Matrix: Waste Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 10:24	krh

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:53	pjb

Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: WW11

ACZ Sample ID: **L29204-03**

Date Sampled: 02/29/16 12:00

Date Received: 03/02/16

Sample Matrix: Waste Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/11/16 10:32	krh

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/11/16 19:54	pjb



Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29204**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29204-01	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L29204-02	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L29204-03	WG399895	Cyanide, total	M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29204**

No certification qualifiers associated with this analysis

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29204
 Date Received: 03/02/2016 09:25
 Received By: ddp
 Date Printed: 3/2/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
4354	2.9	<=6.0	14	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29204
Date Received: 03/02/2016 09:25
Received By: ddp
Date Printed: 3/2/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc. U9204

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza
Company: Tahoe Resources inc.
E-mail: M.Berganza@sanrafael.com.gt

Address: Bulevar los Pinos 15 calle 2469 zona 10
Empresarial Zona Pradera Torre 1 oficina 1406
Telephone: (502) 5951-5248

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tahoe Resources inc
E-mail: M.Berganza@sanrafael.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State _____ Zip code _____ Time Zone _____

*Sampler's Signature: _____ I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Quote #: water quality
PO#: FScobal
Reporting state for compliance testing:
Check box if samples include NRC licensed material?

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers															
SW4A	29/02/10 09:15	SW	1	/														
WW6	29/02/10 11:45	WW	1	/														
WW9	29/02/10 03:00-12:00	WW	1	/														
WW10	29/02/10 12:00	WW	1	/														
WW11	29/02/10 02:00-12:00	WW	1	/														

COPY

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Present results of WW9, WW10 & WW11 in a different report.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
<u>[Signature]</u>	<u>29/02/2010</u> <u>15:20</u>	<u>[Signature]</u>	<u>29/2/10 15:30</u> <u>3-2-10-0905</u>



29204-1603141314

Yellow - Retain for your records.



ECOSISTEMAS
PROYECTOS AMBIENTALES

LABORATORIO AMBIENTAL E INDUSTRIAL

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Ref 422-16

Pág 1/2

REG 016 Resultados de Análisis

Muestra: 1 muestra de agua compuesta (según información del cliente)

Alicuota 1: 03:00 horas

Alicuota 2: 06:00horas

Alicuota 3: 09:00 horas

Alicuota 4: 12:00 horas

Análisis solicitado por: Ing. Miguel Berganza

Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa

Procedencia de la muestra: Proyecto Escobal

Fecha de muestreo: 160316

Fecha de ingreso de muestra: 160316

Fecha de análisis: 160316-300316

Fecha del informe: 300316

Identificación de la muestra: WW9

Correlativo Ecosistemas: 4161

Acuerdo Gubernativo 236-2006 (excepto cianuros)

Límites Máximos Permisibles Entes
Generadores Nuevos
Acuerdo 236-2006

PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Potencial de Hidrogeno pH (Laboratorio)	unidades	1	7.44	SMWW 4500H-B	6 a 9
* Aceites y Grasas	mg/l	5	N.D.	EPA 1664	10
Materia Flotante	---	---	ausente ***	Visual	ausente
Demanda Bioquímica de Oxígeno DBO ₅	mg/l	10	< 10	Oxitop-Merck Análogo SMWW 5210D	ver nota
* Demanda Química de Oxígeno DQO	mg/l	25	< 25	Reflujo Cerrado, Merck, análogo SMWW 5220D	no especificado
Relación DBO ₅ /DQO	---	---	---	---	---
Relación DQO/DBO ₅	---	---	---	---	---
* Sólidos Suspendidos	mg/l	10	< 10	SMWW 2540D	100
* Sólidos Sedimentables	ml/l	0.1	< 0.1	SMWW 2540F	no especificado
Nitrógeno Total	mg/l	10	N.D.	Digestión alcalina persulfato colorimétrico HACH	20
Fósforo Total	mg/l	0.05	N.D.	Spectroquant Merck Análogo EPA 365.2+3, SMWW 4500-P E, ISO 6978/1, DIN EN 1189 D11	10
* Arsénico As	mg/l	0.002	0.008	UNICAM AN40177_E10/03C	0.1
* Cadmio Cd	mg/l	0.02	N.D.	SMWW 3111B	0.1
* Cobre Cu	mg/l	0.03	N.D.	SMWW 3111B	3
Cromo Hexavalente Cr(VI)	mg/l	0.05	N.D.	Colorimétrico Merck, análogo SMWW 3500-Cr-D	0.1
* Mercurio Hg	mg/l	0.004	N.D.	UNICAM AN40181_E10/03C	0.01
* Niquel Ni	mg/l	0.05	N.D.	SMWW 3111B	2

PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
					descarga a cuerpo receptor
* Plomo Pb	mg/l	0.05	N.D.	SMWW 3111B	0.4
* Zinc Zn	mg/l	0.01	0.06	SMWW 3111B	10
Color Aparente	UC HZ equiv. Unid. Pt-Co	1	6	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	500
Color Real	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	
** Coliformes Fecales	NMP/100ml	2	4.5	NMP	< 1 x 10 ⁴

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración. pH < 2 en muestra para análisis de metales y Aceites y Grasas

Metodología: Espectrofotométricos / Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977. EPA 1664

N.D. No detectable. Debajo del límite de detección.

NMP: Número más probable

El valor DQO/DBO₅ y DBO₅/DQO no se ha determinado porque el resultado se encuentra abajo de nuestros límites de detección.

Respecto a la DBO el acuerdo 236-2006 la relaciona como "carga" junto al caudal y como meta de cumplimiento un valor de DBO de 200 mg/l (ver Acuerdo Artículo 21).

Los resultados obtenidos corresponden únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

** Análisis acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04*

*** Análisis referido.*

**** El resultado se basa en el análisis visual de la muestra enviada por el cliente al laboratorio.*

Comparación de descarga según información del cliente.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

Luis Fernando Fuentes Méndez
Ingeniero Químico
Colegiado 876

March 24, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29510

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on March 18, 2016. This project has been assigned to ACZ's project number, L29510. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29510. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after April 23, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: WW9

ACZ Sample ID: **L29510-01**

Date Sampled: 03/16/16 12:00

Date Received: 03/18/16

Sample Matrix: Waste Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								03/23/16 14:34	enb

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	03/23/16 22:13	pjb



Report Header Explanations

Table with 2 columns: Term and Definition. Includes terms like Batch, Found, Limit, Lower, MDL, PCN/SCN, PQL, QC, Rec, RPD, Upper, and Sample.

QC Sample Types

Table with 4 columns: Code, Description, Code, Description. Lists various QC sample types such as AS, ASD, CCB, CCV, DUP, ICB, ICV, ICSAB, LCSS, LCSSD, LCSW, LCSWD, LFB, LFM, LFMD, LRB, MS, MSD, PBS, PBW, PQV, and SDL.

QC Sample Type Explanations

Table with 2 columns: Sample Type and Explanation. Explains Blanks, Control Samples, Duplicates, Spikes/Fortified Matrix, and Standard.

ACZ Qualifiers (Qual)

Table with 2 columns: Qualifier and Description. Lists B, H, L, and U with their respective meanings.

Method References

- List of 5 method references including EPA 600/4-83-020, EPA 600/R-93-100, EPA 600/R-94-111, EPA SW-846, and Standard Methods for the Examination of Water and Wastewater.

Comments

- List of 5 comments regarding QC results, matrix reporting, and MDL/PQL reporting.

For a complete list of ACZ's Extended Qualifiers, please click: <http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29510**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29510-01	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L29510-02	WG400462	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29510**

No certification qualifiers associated with this analysis

Tahoe Resources, Inc.
 Escobal

ACZ Project ID: L29510
 Date Received: 03/18/2016 10:00
 Received By: ddp
 Date Printed: 3/18/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
2758	7.8	<=6.0	14	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
Escobal

ACZ Project ID: L29510
Date Received: 03/18/2016 10:00
Received By: ddp
Date Printed: 3/18/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc. 629510

CHAIN of CUSTODY

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Report to:

Name: Miguel Berganza
Company: Tabor Resources Inc
E-mail: M.Berganza@taborresources.com

Address: Bullhorn 105 Progreso 18500 24-64 200910
Empresarial Zona Progreso Torre W Oficina 1406
Telephone: (502) 5951 5248

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tabor Resources Inc
E-mail: M.Berganza@taborresources.com

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No

If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF Sampler's Site Information State Zip code Time Zone

*Sampler's Signature I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Table with columns: Quote #, PO#, Reporting state, Check box, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, SW, total CN, and analysis columns.

1. *
2. *

COPY

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Report cyanide results in a different report

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY: DATE:TIME RECEIVED BY: DATE:TIME

Handwritten signatures and dates for relinquished and received parties.



L29510-1603241002

REG 016 Resultados de Análisis

Muestra: 1 muestra de agua compuesta (según información del cliente)

Alicuota 1: 03:00 horas

Alicuota 2: 06:00 horas

Alicuota 3: 09:00 horas

Alicuota 4: 12:00 horas

Análisis solicitado por: Ing. Miguel Berganza

Dirección: Km. 97.5 carretera Mataquesuintla, Aldea Sabana Redonda, San Rafael Las Flores. Santa Rosa

Procedencia de la muestra: Proyecto Escobal

Fecha de muestreo: 110416

Fecha de ingreso de muestras: 110416

Fecha de análisis: 110416-200416

Fecha de informe: 200416

Identificación de la muestra: WW9

Correlativo Ecosistemas: 4444

Acuerdo Gubernativo 236-2006 (excepto cianuros)					Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	descarga a cuerpo receptor
* Potencial de Hidrogeno pH (Laboratorio)	unidades	1	7.19	SMWW 4500H-B	6 a 9
* Aceites y Grasas	mg/l	5	N.D.	EPA 1664	10
Materia Flotante	---	---	ausente ***	Visual	ausente
Demanda Bioquímica de Oxígeno DBO ₅	mg/l	10	< 10	Oxitop-Merck Análogo SMWW 5210D	ver nota
* Demanda Química de Oxígeno DQO	mg/l	25	< 25	Reflujo Cerrado, Merck, análogo SMWW 5220D	no especificado
Relación DBO ₅ /DQO	---	---	---	---	---
Relación DQO/DBO ₅	---	---	---	---	---
* Sólidos Suspendidos	mg/l	10	< 10	SMWW 2540D	100
* Sólidos Sedimentables	ml/l	0.1	< 0.1	SMWW 2540F	no especificado
Nitrógeno Total	mg/l	10	N.D.	Digestión alcalina persulfato colorimétrico HACH	20
Fósforo Total	mg/l	0.05	N.D.	Spectroquant Merck Análogo EPA 365.2+3, SMWW 4500-P E, ISO 6978/1, DIN EN 1189 D11	10
* Arsénico As	mg/l	0.002	0.007	UNICAM AN40177_E10/03C	0.1
* Cadmio Cd	mg/l	0.02	N.D.	SMWW 3111B	0.1
* Cobre Cu	mg/l	0.03	N.D.	SMWW 3111B	3
Cromo Hexavalente Cr(VI)	mg/l	0.05	N.D.	Colorimétrico Merck, análogo SMWW 3500- Cr-D	0.1
* Mercurio Hg	mg/l	0.004	N.D.	UNICAM AN40181_E10/03C	0.01
* Níquel Ni	mg/l	0.05	N.D.	SMWW 3111B	2

PARAMETRO	DIMENSIONAL	LIMITE DE DETECCION	RESULTADO	METODOLOGIA	Límites Máximos Permisibles Entes Generadores Nuevos Acuerdo 236-2006
					descarga a cuerpo receptor
* Plomo Pb	mg/l	0.05	N.D.	SMWW 3111B	0.4
* Zinc Zn	mg/l	0.01	N.D.	SMWW 3111B	10
Color Aparente	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	500
Color Real	UC HZ equiv. Unid. Pt-Co	1	< 1	Colorimétrico Merck, análogo APHA 2120B, DIN 53409	
** Coliformes Fecales	NMP/100ml	2	540	NMP	< 1 x 10 ⁴

Notas:

Captación de muestras: La muestra fue captada por personal ajeno a Ecosistemas.

Transporte y preservación de la muestra: Refrigeración. pH < 2 en muestra para análisis de metales y Aceites y Grasas

Metodología: Espectrofotométricos / Standard Methods for water and wastewater APHA, AWWA, 22 edic.

Organic Reagents for Trace Analysis. J.Fries/H. Getrost. E. Merck Darmstadt. 1977. EPA 1664

N.D. No detectable. Debajo del límite de detección.

NMP: Número más probable

El valor DQO/DBO₅ y DBO₅/DQO no se ha determinado porque el resultado se encuentra abajo de nuestros límites de detección.

Respecto a la DBO el acuerdo 236-2006 la relaciona como "carga" junto al caudal y como meta de cumplimiento un valor de DBO de 200 mg/l (ver Acuerdo Artículo 21).

Los resultados obtenidos corresponden únicamente a la muestra recibida por el personal de Ecosistemas Proyectos Ambientales.

Se prohíbe la reproducción total o parcial de este informe sin la autorización escrita de Ecosistemas Proyectos Ambientales.

*** Análisis acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04**

**** Análisis referido.**

***** El resultado se basa en el análisis visual de la muestra enviada por el cliente al laboratorio.**

Comparación de descarga según información del cliente.



Ing. Oscar Páez
Gerente Técnico



VoBo Ing. Fernando Fuentes
Gerente de Calidad

Luis Fernando Fuentes Méndez
Ingeniero Químico
Colegiado 876

April 18, 2016

Report to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Bill to:

Miguel Berganza
Tahoe Resources, Inc.
Boulevard Los Proceres 18 c. 24-69 zona 10
Centro
Corporativo Zona Pradera, Torre 4 Of. 1408 Guatemala

Project ID: Escobal

ACZ Project ID: L29894

Miguel Berganza:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on April 13, 2016. This project has been assigned to ACZ's project number, L29894. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan. The enclosed results relate only to the samples received under L29894. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

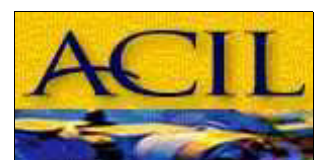
This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after May 18, 2016. If the samples are determined to be hazardous, additional charges apply for disposal (typically \$11/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical raw data reports for ten years.

If you have any questions or other needs, please contact your Project Manager.



Sue Webber has reviewed and approved this report.



Tahoe Resources, Inc.

Project ID: Escobal

Sample ID: WW9

ACZ Sample ID: **L29894-01**

Date Sampled: 04/11/16 12:00

Date Received: 04/13/16

Sample Matrix: Waste Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								04/15/16 15:31	spl

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	04/16/16 14:08	pjb

Tahoe Resources, Inc.

Project ID: Escobal
 Sample ID: WW10

ACZ Sample ID: **L29894-02**
 Date Sampled: 04/11/16 12:00
 Date Received: 04/13/16
 Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								04/15/16 15:40	spl

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	04/16/16 14:08	pjb

Report Header Explanations

<i>Batch</i>	A distinct set of samples analyzed at a specific time
<i>Found</i>	Value of the QC Type of interest
<i>Limit</i>	Upper limit for RPD, in %.
<i>Lower</i>	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
<i>MDL</i>	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
<i>PCN/SCN</i>	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
<i>PQL</i>	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
<i>QC</i>	True Value of the Control Sample or the amount added to the Spike
<i>Rec</i>	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
<i>RPD</i>	Relative Percent Difference, calculation used for Duplicate QC Types
<i>Upper</i>	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
<i>Sample</i>	Value of the Sample of interest

QC Sample Types

<i>AS</i>	Analytical Spike (Post Digestion)	<i>LCSWD</i>	Laboratory Control Sample - Water Duplicate
<i>ASD</i>	Analytical Spike (Post Digestion) Duplicate	<i>LFB</i>	Laboratory Fortified Blank
<i>CCB</i>	Continuing Calibration Blank	<i>LFM</i>	Laboratory Fortified Matrix
<i>CCV</i>	Continuing Calibration Verification standard	<i>LFMD</i>	Laboratory Fortified Matrix Duplicate
<i>DUP</i>	Sample Duplicate	<i>LRB</i>	Laboratory Reagent Blank
<i>ICB</i>	Initial Calibration Blank	<i>MS</i>	Matrix Spike
<i>ICV</i>	Initial Calibration Verification standard	<i>MSD</i>	Matrix Spike Duplicate
<i>ICSAB</i>	Inter-element Correction Standard - A plus B solutions	<i>PBS</i>	Prep Blank - Soil
<i>LCSS</i>	Laboratory Control Sample - Soil	<i>PBW</i>	Prep Blank - Water
<i>LCSSD</i>	Laboratory Control Sample - Soil Duplicate	<i>PQV</i>	Practical Quantitation Verification standard
<i>LCSW</i>	Laboratory Control Sample - Water	<i>SDL</i>	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL. The associated value is an estimated quantity.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
L	Target analyte response was below the laboratory defined negative threshold.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Method References

- (1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
- (2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
- (3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
- (4) EPA SW-846. Test Methods for Evaluating Solid Waste.
- (5) Standard Methods for the Examination of Water and Wastewater.

Comments

- (1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
- (2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
- (3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
- (4) An asterisk in the "XQ" column indicates there is an extended qualifier and/or certification qualifier associated with the result.
- (5) If the MDL equals the PQL or the MDL column is omitted, the PQL is the reporting limit.

For a complete list of ACZ's Extended Qualifiers, please click:

<http://www.acz.com/public/extquallist.pdf>

Tahoe Resources, Inc.

ACZ Project ID: **L29894**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L29894-01	WG401525	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
L29894-02	WG401525	Cyanide, total	M335.4 - Colorimetric w/ distillation	Q6	Sample was received above recommended temperature.
			M335.4 - Colorimetric w/ distillation	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Tahoe Resources, Inc.

ACZ Project ID: **L29894**

No certification qualifiers associated with this analysis

Tahoe Resources, Inc.
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ACZ Project ID: L29894
 Date Received: 04/13/2016 09:42
 Received By: ddp
 Date Printed: 4/13/2016

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody form or other directive shipping papers present?	X		
3) Does this project require special handling procedures such as CLP protocol?			X
4) Are any samples NRC licensable material?			X
5) If samples are received past hold time, proceed with requested short hold time analyses?	X		
6) Is the Chain of Custody form complete and accurate?	X		
7) Were any changes made to the Chain of Custody form prior to ACZ receiving the samples?		X	

Samples/Containers

	YES	NO	NA
8) Are all containers intact and with no leaks?	X		
9) Are all labels on containers and are they intact and legible?	X		
10) Do the sample labels and Chain of Custody form match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits? ¹			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
3331	12.5	<=6.0	13	N/A

Was ice present in the shipment container(s)?

Yes - Gel ice was present in the shipment container(s) but was thawed by receipt at ACZ.

Client must contact an ACZ Project Manager if analysis should not proceed for samples received outside of their thermal preservation acceptance criteria.

Tahoe Resources, Inc.
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ACZ Project ID: L29894
Date Received: 04/13/2016 09:42
Received By: ddp
Date Printed: 4/13/2016

¹ The preservation of the following bottle types is not checked at sample receipt: Orange (oil and grease), Purple (total cyanide), Pink (dissolved cyanide), Brown (arsenic speciation), Sterile (fecal coliform), EDTA (sulfite), HCl preserved vial (organics), Na₂S₂O₃ preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

29894

CHAIN of CUSTODY

Report to:

Name: Miguel Berganza
Company: Tahoe Resources Inc.
E-mail: MBerganza@sanrafael.com.gt

Address: Zivivur los Proceres, Zona 10
Empresarial, Zona Pradera, Torre IV Oficina 1406
Telephone: (502) 5951 5248

COPY

Copy of Report to:

Name:
Company:

E-mail:
Telephone:

Invoice to:

Name: Miguel Berganza
Company: Tahoe Resources Inc.
E-mail: MBerganza@sanrafael.com.gt

Address:
Telephone:

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified

Are samples for SDWA Compliance Monitoring? Yes No
If yes, please include state forms. Results will be reported to PQL for Colorado.

Sampler's Name: LF
Sampler's Site Information State Zip code Time Zone
*Sampler's Signature:
I attest to the authenticity and validity of this sample. I understand that intentionally mislabeling the time/date/location or tampering with the sample in anyway, is considered fraud and punishable by State Law.

PROJECT INFORMATION

ANALYSES REQUESTED (attach list or use quote number)

Table with columns: Quote #, PO#, Reporting state, Check box, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, SW, total on. Includes handwritten entries for WW9, WW10, Pleta 3, Pozo PP, EP-10.

Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Present results of cyanide samples of the 10th in one report and cyanid from the 11th in another.

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

Table with columns: RELINQUISHED BY, DATE:TIME, RECEIVED BY, DATE:TIME. Includes handwritten signatures and dates.

