

Preparado para:

**Ministerio de Ambiente y Recursos Naturales  
(MARN)**

**Proyecto Minero Escobal  
Informe Consolidado Trimestral 22-2017**

Preparado por:

  
**MINERA  
SANRAFAEL**  
**Departamento de Ambiente**

San Rafael Las Flores, Santa Rosa, Guatemala

AGOSTO - OCTUBRE 2017

**I. ÍNDICE GENERAL**

1 Resumen ejecutivo ..... 1

2 Introducción ..... 4

3 Condiciones Ambientales ..... 7

4 Calidad de Aire ..... 11

    4.1 Material Particulado ..... 11

        4.1.1 Sitios de Monitoreo ..... 11

        4.1.2 Resultados ..... 13

    4.2 Metales en Material Particulado ..... 14

        4.2.1 Sitios de Monitoreo ..... 14

        4.2.2 Resultados ..... 14

    4.3 Partículas Sedimentables Totales (PST) ..... 17

        4.3.1 Sitios de Monitoreo ..... 17

        4.3.2 Resultados ..... 19

    4.4 Gases de Combustión (SO<sub>2</sub> y NO<sub>2</sub>) ..... 21

        4.4.1 Sitios de Monitoreo ..... 21

        4.4.2 Resultados ..... 23

    4.5 Niveles de Presión Sonora ..... 25

        4.5.1 Sitios de Monitoreo ..... 25

        4.5.2 Resultados ..... 27

5 Calidad del Agua ..... 31

    5.1 Sitios de Monitoreo ..... 31

    5.2 Resultados ..... 37

        5.2.1 Control de Calidad ..... 37

        5.2.2 Agua Superficial ..... 39

        5.2.3 Agua Subterránea ..... 49

6 Sedimentos ..... 61

    6.1 Sitios de Monitoreo ..... 61

    6.2 Resultados ..... 63



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7	Calidad de Efluentes .....	65
7.1	Sitios de Monitoreo .....	65
7.2	Resultados .....	67
8	Vibraciones .....	69
8.1	Sitios de Monitoreo .....	69
8.2	Resultados .....	71
9	Geoquímica de Roca Estéril .....	72
10	Mediciones de Seguridad Industrial y Salud Ocupacional .....	73
10.1	Presión Sonora .....	73
10.2	Mediciones de Partículas Respirables .....	75
10.3	Mediciones de Gas .....	78
11	Conclusiones .....	81
11.1	Mediciones del aire en el ambiente .....	81
11.2	Mediciones del agua, sedimentos y efluentes en el ambiente .....	81
11.3	Mediciones de seguridad industrial y salud ocupacional .....	81
12	Anexos .....	83
12.1	Caudal Bombeado de Túneles a Planta de Tratamiento y su descarga hacia la Quebrada El Escobal .....	83
12.2	Análisis In Situ y kit de cianuro (CN) en Efluentes .....	85
12.3	Resultados crudos de calidad de aire .....	87
12.3.1	Material Particulado (PM <sub>10</sub> ) .....	87
12.3.2	Informe de Metales en PM <sub>10</sub> .....	88
12.3.3	Informe sobre PST y Gases de Combustión .....	89
12.3.4	Presión Sonora .....	90
12.4	Certificados de verificación de los equipos utilizados .....	91
12.4.1	Material Particulado (PM <sub>10</sub> ) y Presión Sonora .....	91
12.5	Informe Original de los Resultados Analíticos obtenidos de muestras de agua del Laboratorio ACZ Laboratories, INC. Correspondiente al Monitoreo de Septiembre de 2017 .....	92
12.5.1	Muestras de Agua Superficial (SW) .....	92

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12.5.2 Muestras de Agua Subterránea (GW) pozos de monitoreo y suministro.....	93
12.6 Informes originales de los Resultados Analíticos obtenidos del muestreo de sedimentos, Septiembre 2017.....	94
12.7 Informes Originales de los Resultados Analíticos obtenidos del Efluente en los meses de Agosto a Octubre de 2017 .....	95



## II. ÍNDICE DE CUADROS

Cuadro 3-1: Condiciones meteorológicas, Proyecto Minero Escobal.....	7
Cuadro 4-1: Sitios de monitoreo de material particulado, Proyecto Minero Escobal .....	11
Cuadro 4-2: Resultados de PM <sub>10</sub> , Proyecto Minero Escobal .....	13
Cuadro 4-3: Sitios de monitoreo de metales en PM <sub>10</sub> , Proyecto Minero Escobal.....	14
Cuadro 4-4: Resultados de concentración de metales en PM <sub>10</sub> , Proyecto Minero Escobal (1/2) .....	15
Cuadro 4-5: Sitios de Monitoreo de PST, Proyecto Minero Escobal .....	17
Cuadro 4-6: Resultados de partículas sedimentables totales, Proyecto Minero Escobal .....	20
Cuadro 4-7: Sitios de Monitoreo de SO <sub>2</sub> y NO <sub>2</sub> , Proyecto Minero Escobal .....	21
Cuadro 4-8: Resultados de gases de combustión, Proyecto Minero Escobal.....	24
Cuadro 4-9: Sitios de Monitoreo de Presión Sonora, Proyecto Minero Escobal.....	25
Cuadro 4-10: Resultados trimestrales de los niveles de presión sonora, Proyecto Minero Escobal .....	28
Cuadro 4-11: Resultados mensuales de los niveles de presión sonora, Proyecto Minero Escobal .....	29
Cuadro 5-1: Sitios de Monitoreo de Calidad de Agua, Proyecto Minero Escobal.....	31
Cuadro 5-2: Resultados de control de calidad, blanco y duplicado, para análisis de agua superficial y subterránea .....	37
Cuadro 5-3: Resultados de la Calidad del Agua Superficial, Proyecto Minero Escobal (1/4) .....	41
Cuadro 5-4: Resultados de la Calidad de Agua Subterránea (manantiales), Proyecto Minero Escobal .....	51
Cuadro 5-5: Resultados de la medición de calidad de agua subterránea (Pozos de Monitoreo, Producción y Artesanal), Proyecto Minero Escobal (1/3) .....	53
Cuadro 6-1: Sitios de Monitoreo de Sedimento, Proyecto Minero Escobal .....	61
Cuadro 6-2: Resultados de sedimentos, Proyecto Minero Escobal.....	64

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Cuadro 7-1: Sitio de Monitoreo de Calidad de Agua del Efluente de Planta de Tratamiento, Proyecto Minero Escobal.....	65
Cuadro 8-1: Estaciones de monitoreo de vibraciones, Proyecto Minero Escobal .....	69
Cuadro 10-1: Resultados de Presión Sonora de Salud Ocupacional, Proyecto Minero Escobal .....	73
Cuadro 10-2: Resultados de Material Particulado de Salud Ocupacional, Proyecto Minero Escobal .....	76
Cuadro 10-3: Extracto de las mediciones del XV trimestre, acorde a procedimiento de tomar la primera etapa del ciclo que aparezca. ....	79

### III. ÍNDICE DE FIGURAS

Figura 3-1: Dirección del viento Agosto 2017, Proyecto Minero Escobal..... 8

Figura 3-2: Dirección del viento Septiembre 2017, Proyecto Minero Escobal ..... 9

Figura 3-3: Dirección del viento Octubre 2017, Proyecto Minero Escobal..... 10

Figura 4-1: Mapa de la ubicación de las estaciones de monitoreo de material particulado, Proyecto Minero Escobal ..... 12

Figura 4-2: Mapa de localización de las estaciones de monitoreo de PST, Proyecto Minero Escobal ..... 18

Figura 4-3: Mapa de localización de las estaciones de monitoreo de gases de combustión, Proyecto Minero Escobal..... 22

Figura 4-4: Mapa de localización de estaciones de monitoreo de presión sonora, Proyecto Minero Escobal ..... 26

Figura 5-1: Mapa de localización de las estaciones de monitoreo de agua superficial, Proyecto Minero Escobal..... 33

Figura 5-2: Mapa de localización de estaciones de monitoreo de agua subterránea (manantiales), Proyecto Minero Escobal ..... 34

Figura 5-3: Mapa de localización de pozos de monitoreo, pozo artesanal y pozo de producción, Proyecto Minero Escobal..... 35

Figura 5-4: Mapa de localización de pozos de suministro, Proyecto Minero Escobal..... 36

Figura 6-1: Mapa de localización de las estaciones de monitoreo de sedimentos, Proyecto Minero Escobal ..... 62

Figura 7-1: Mapa de localización de la estación de monitoreo del Efluente de Planta de Tratamiento, Proyecto Minero Escobal..... 66

Figura 8-1: Mapa de localización de las estaciones de monitoreo de vibraciones, Proyecto Minero Escobal ..... 70



### IV. ÍNDICE DE FOTOGRAFÍAS

Fotografía 3-1: Estación meteorológica Escobal, San Rafael Las Flores, Santa Rosa ..... 7

## 1 Resumen ejecutivo

A continuación se presentan los resultados del informe trimestral consolidado comprendido entre Agosto a Octubre de 2017, el cual incluye los componentes de calidad del aire: material particulado, metales en material particulado, gases de combustión y niveles de presión sonora. Asimismo la calidad del agua, sedimentos, calidad de efluente, vibraciones, geoquímica de roca y salud y seguridad ocupacional. Lo anterior en cumplimiento a la resolución 549-2012/DIGARN/ODGR/hapc del Ministerio de Ambiente y Recursos Naturales.

### 1.1 Calidad del aire

Un total de nueve estaciones fueron monitoreadas para determinar la concentración de  $PM_{10}$  y niveles de presión sonora. Además se monitorearon siete estaciones para medir concentración de metales en  $PM_{10}$ , sólidos sedimentables totales y gases de combustión.

Los valores de  $PM_{10}$  registrados durante el monitoreo (1.66 a  $42.86 \mu\text{g}/\text{m}^3$ ), se encuentran dentro de los valores máximos permisibles, conforme a los valores establecidos por la EPA, el Banco Mundial ( $150 \mu\text{g}/\text{m}^3$ ) y conforme a lo establecido en la línea base. La concentración de metales registradas durante Agosto de 2017 se encontraron en el rango de los valores registrados durante los trimestres anteriores, en todas las estaciones de monitoreo.

Los valores de partículas sedimentables totales se encuentran entre 0.42 a  $51.40 \text{ g}/(\text{m}^2 \times 30 \text{ días})$ , los cuales corresponden a las estaciones EA-2B y EA-1C respectivamente. Ningún registro se encuentra por arriba del valor máximo registrado durante el establecimiento de la línea base.

Los valores de gases de combustión se encontraron por debajo del límite de detección del método en todas las estaciones para  $\text{SO}_2$  ( $<13 \mu\text{g}/\text{m}^3$ ) y  $\text{NO}_2$  ( $<9 \mu\text{g}/\text{m}^3$ ), a excepción del valor encontrado en EA-2B de  $9 \mu\text{g}/\text{m}^3$ .

Los niveles de presión sonora registrados en 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 de ER-7A durante las mediciones de octubre para promedio diurno y las mediciones de agosto y septiembre para promedio nocturno.

## 1.2 Calidad del agua

Se monitorearon 11 estaciones de agua superficial, 5 estaciones de agua subterránea (manantiales), 2 estaciones de pozos de producción y 10 estaciones de agua en pozos de monitoreo ubicadas en el AID del proyecto. Del control de calidad (blancos de campo) se obtuvieron resultados confiables tanto en la manipulación de las muestras como en los resultados de los análisis. 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) y el establecimiento de la línea base, a excepción de una estación de agua superficial. 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). El plomo se detectó en SW, GW y MW en concentraciones por debajo de lo sugerido por la USEPA.

## 1.3 Sedimentos

Se monitorearon 11 estaciones (las mismas de agua superficial). No se detectó cianuro en ninguna de las estaciones muestreadas. El mercurio se registró únicamente en la estación SED-5, 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, Cromo y Plomo registradas están por debajo de los valores guía. Todas las estaciones muestreadas registraron concentraciones de Arsénico menor al valor sugerido (50 mg/kg) por el acuerdo 236-2006.

## 1.4 Calidad del efluente

Debido a la suspensión temporal de la licencia de explotación de la empresa, no se reporta descarga de agua proveniente de la planta de tratamiento de aguas residuales de tipo especial del proceso de minado durante el trimestre de Agosto a Octubre de 2017.

## 1.5 Vibraciones

Debido a la suspensión temporal de la licencia de explotación de la empresa, no se realizaron voladuras en los frentes de trabajo. Por lo que no se registraron vibraciones asociadas a voladuras en los equipos de medición continua durante el trimestre de Agosto a Octubre de 2017.

### 1.6 Geoquímica de roca

Debido a la suspensión temporal de la licencia de explotación de la empresa, no se extrajeron muestras de roca de los túneles del proyecto para llevar a cabo el análisis de pH en pasta, durante el trimestre de Agosto a Octubre de 2017.

### 1.7 Salud y seguridad ocupacional

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 al acuerdo gubernativo 229-2014 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.

## 2 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 Agosto a Octubre de 2017.

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.”
- D.** Resultados del monitoreo ambiental como parte de los compromisos de la empresa ante el MARN con base en la resolución 05801-2016/DIGARN/DCA/OBT/rdor, compromiso número XIII; el cual se lee: “Cumplir fielmente y a cabalidad con los compromisos adquiridos en la Resolución Aprobatoria No. 3061-2011/DIGARN/ECM/beor, de fecha 19 de octubre de 2011, referida al proyecto original denominado Proyecto Minero Escobal...”

Todos los procedimientos y métodos analíticos presentados en el siguiente reporte, pueden consultarse en las versiones previas a estos informes trimestrales. 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 ( $PM_{10}$ ), en microgramos por metro cúbico ( $\mu g/m^3$ ). También se monitorearon siete estaciones para medir la concentración de metales en  $PM_{10}$ , sólidos sedimentables totales (PST), y gases de combustión: dióxido de azufre ( $SO_2$ ) 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 estación de pozos de producción y 10 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: No se tomaron muestras mensuales en el efluente de la planta de tratamiento de aguas proveniente de los túneles del proyecto, debido a la suspensión temporal de la licencia de explotación de la empresa. Por lo que no se reporta descarga de agua proveniente de la planta de tratamiento de aguas residuales de tipo especial del proceso de minado durante el trimestre de Agosto a Octubre de 2017. Del agua contenida en la pileta de cumplimiento ambiental, en el anexo 12.2 se presenta una copia de los registros diarios.
- Vibraciones: Están instalados tres sismógrafos, los cuales registraron la velocidad de partícula durante cada una de las voladuras. Debido a la suspensión temporal de la licencia de explotación de la empresa, no se realizaron voladuras en los frentes de trabajo. Por lo que no se registraron vibraciones asociadas a voladuras en los equipos de medición continua durante el trimestre de Agosto a Octubre de 2017.
- Geoquímica de roca estéril: Debido a la suspensión temporal de la licencia de explotación de la empresa, no se extrajeron muestras de roca de los túneles del proyecto para llevar a cabo el análisis de pH en pasta, durante el trimestre de Agosto a Octubre de 2017.
- Mediciones de Seguridad y Salud Ocupacional: Debido a la suspensión temporal de la licencia de explotación de la empresa, se realizaron mediciones irregulares de niveles de presión sonora, material particulado y un extracto de las mediciones rutinarias de gases para determinar ácido sulfhídrico (H<sub>2</sub>S).
- Copia de registro documentado del caudal bombeado de los pozos del agua bombeada desde los túneles hacia las piletas. En el anexo 12.1 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 Agosto a Octubre de 2017.
- Copia de registro documentado del análisis In Situ y kit de Cianuro de efluentes. En el anexo 12.2 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), durante los meses de Agosto a Octubre de 2017.

### 3 Condiciones Ambientales

En el Cuadro 3-1 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 Agosto a Octubre de 2017.

Cuadro 3-1: 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
<b>Agosto 2017</b>										
29.4	13	20.9	24.7	0.2	3.1	29.7	100	30.5	79.8	129.5
<b>Septiembre 2017</b>										
29.4	14.3	20	15.4	0.2	0.9	22.8	100	5.9	90.5	268.9
<b>Octubre 2017</b>										
26.7	14.9	19.9	38.9	0.2	5.6	49.23	100	39.5	83.9	139.7

°C = grados centígrados. Km/h = kilómetros por hora. % = porcentaje. mm = milímetros. Max = valor máximo. Min = valor mínimo. Fuente: MSR, 2017.

Durante el trimestre se registró una temperatura promedio de entre los 19.9° a los 20.9°C y en el mes de Septiembre se registró la mayor precipitación (201.39 mm). En conjunto durante el trimestre se presentó una precipitación de 538.1 mm. El mes que mayor humedad relativa promedio presentó fue Septiembre con 90.5% y el mes que en promedio presentó la mayor velocidad de vientos fue Octubre con 38.9 km/h. En la Fotografía 3-1 se muestra la ubicación de la estación meteorológica, donde se registran las condiciones ambientales que se reportan.

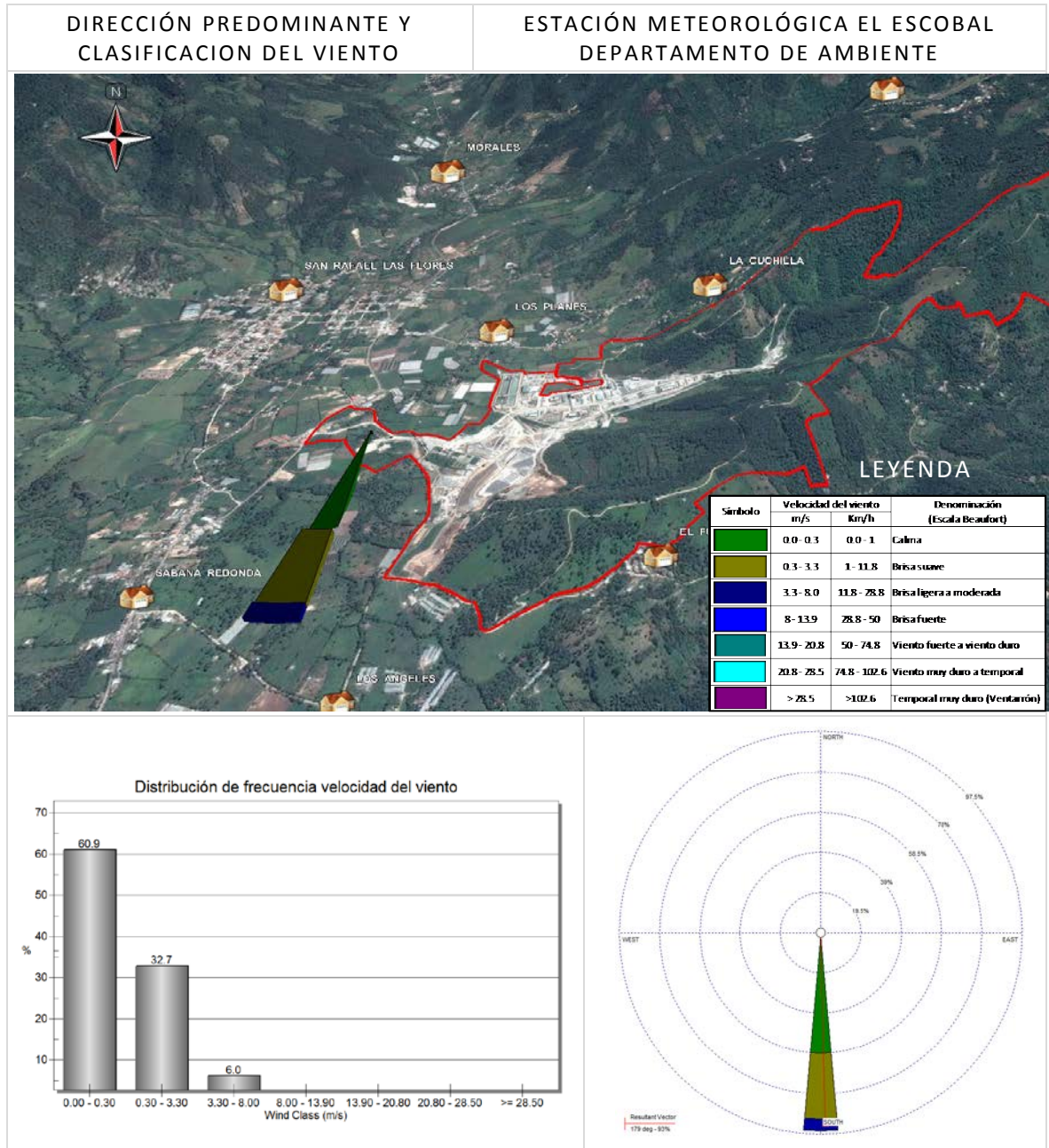


Fotografía 3-1: Estación meteorológica Escobal, San Rafael Las Flores, Santa Rosa

Fuente: MSR, 2017.

Como se puede observar en la Figura 3-1, Figura 3-2 y Figura 3-3 la predominancia de los vientos durante el trimestre fue de noroeste a sur y la denominación predominante, de acuerdo a la escala de Beaufort, fue de "calma".

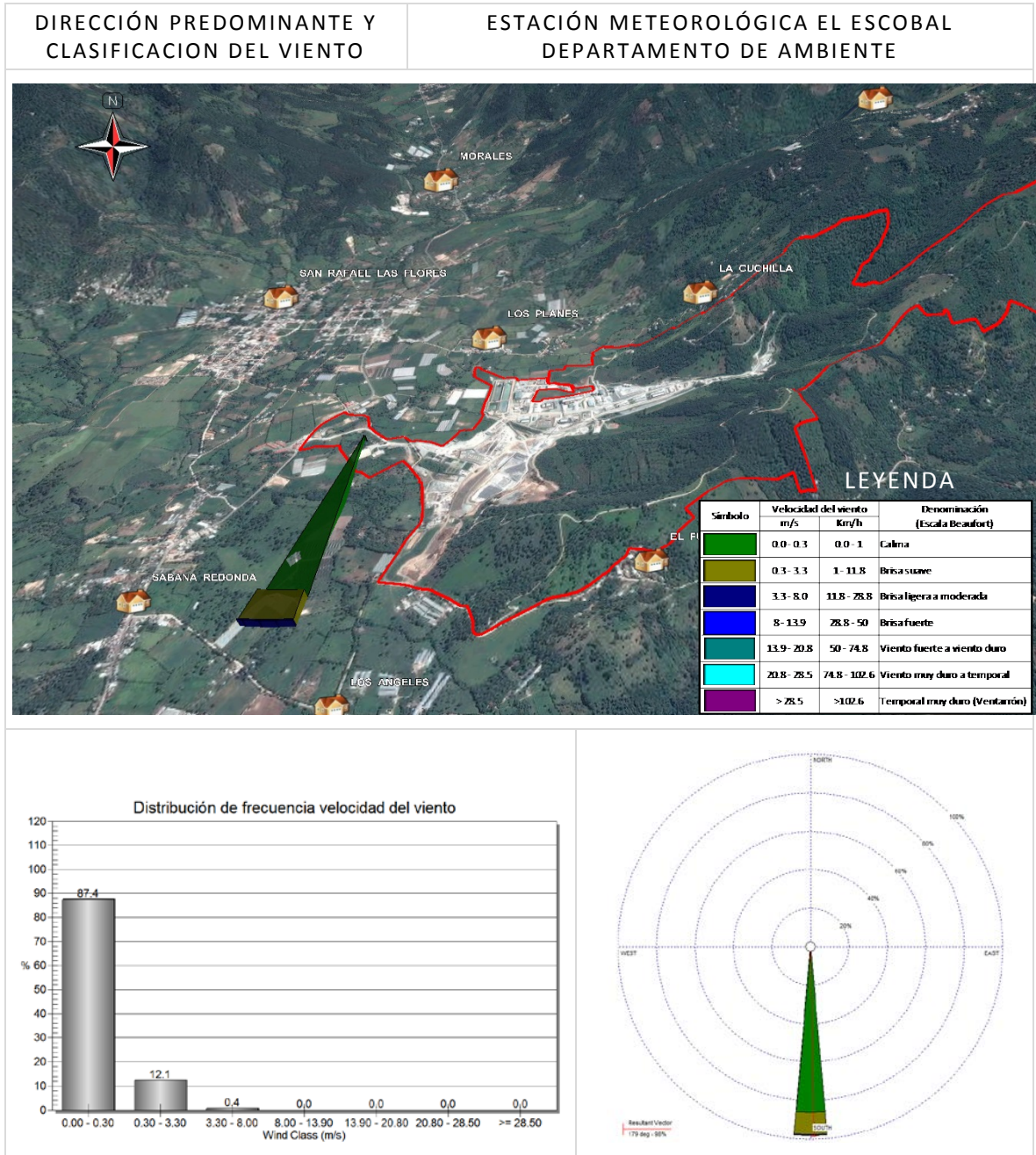
Figura 3-1: Dirección del viento Agosto 2017, Proyecto Minero Escobal



Fuente: MSR, 2017.

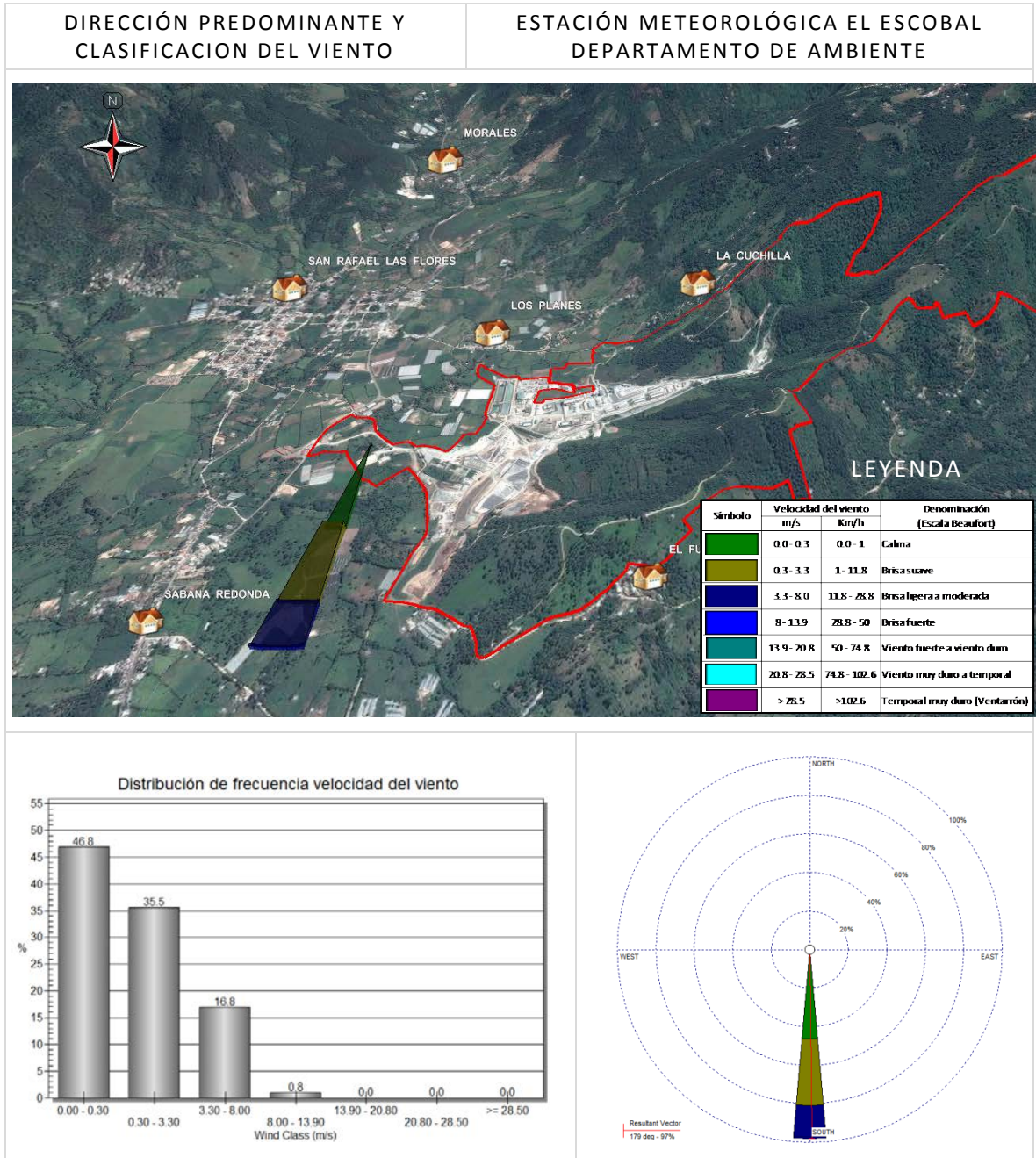


Figura 3-2: Dirección del viento Septiembre 2017, Proyecto Minero Escobal



Fuente: MSR, 2017.

Figura 3-3: Dirección del viento Octubre 2017, Proyecto Minero Escobal



Fuente: MSR, 2017.

## 4 Calidad de Aire

### 4.1 Material Particulado

#### 4.1.1 Sitios de Monitoreo

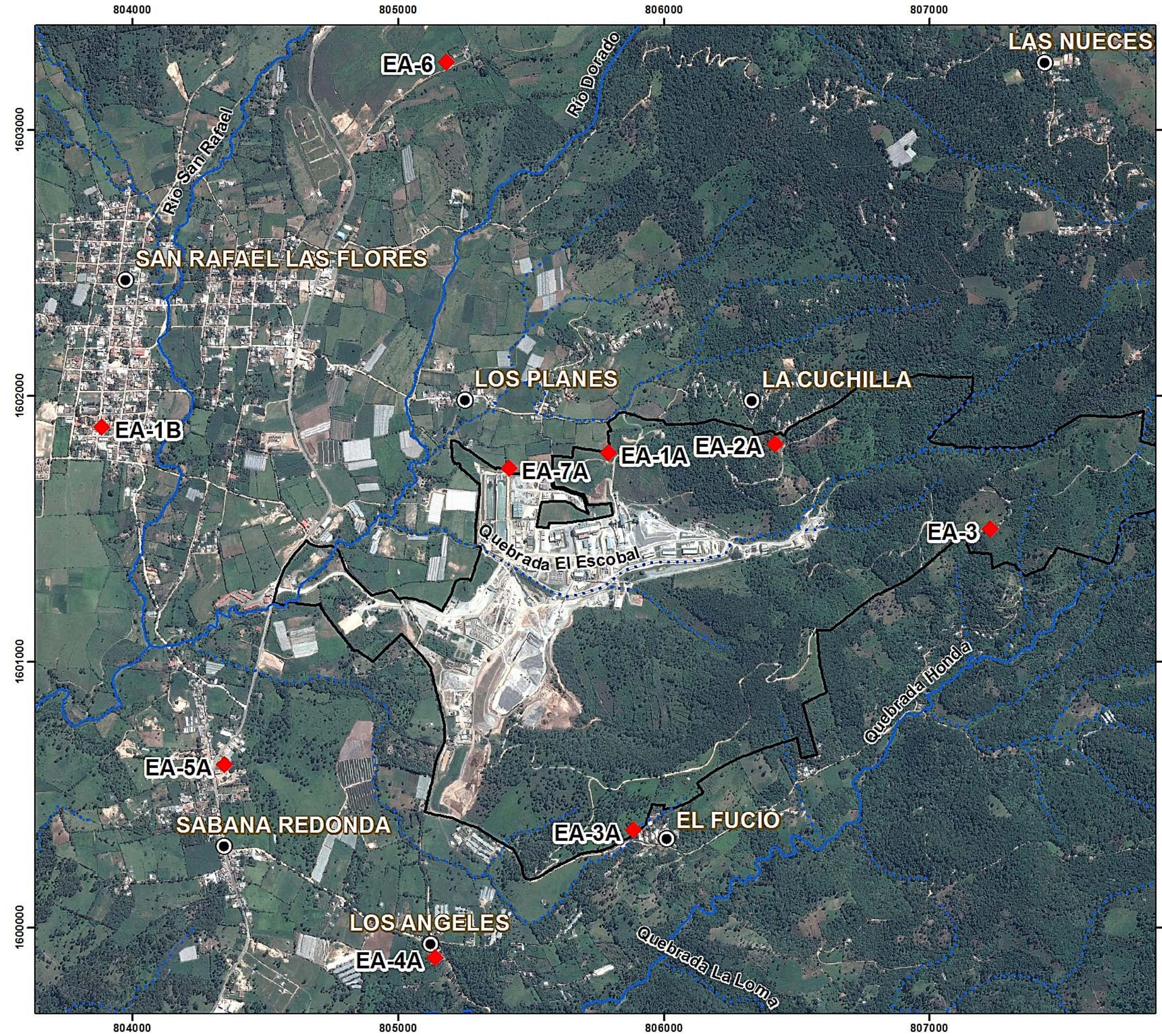
En el Cuadro 4-1 se enlistan las estaciones de monitoreo de material particulado ( $PM_{10}$ ) menor o igual a 10 micrómetros, localizadas dentro de los terrenos de la mina y en la jurisdicción de los centros poblados ubicados en el área de influencia (AI) del Proyecto: Los Planes, La Cuchilla, El Fucío,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

Cuadro 4-1: Sitios de monitoreo de material particulado, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio	Período línea base
<b>Periodicidad de monitoreo mensual</b>					
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
<b>Periodicidad de monitoreo trimestral</b>					
EA-1B	803,894	1,601,727	1,328	Poblado San Rafael Las Flores, cercano a Escuela	No cuenta con línea base
EA-3A	806,000	1,600,108	1,416	Aldea El Fucío	
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, 2017.





**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**

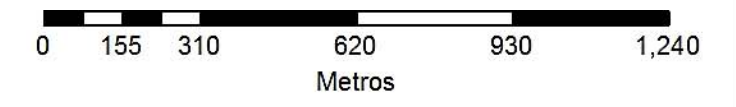
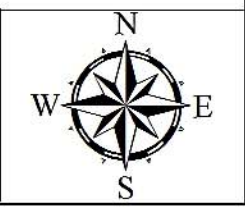
Símbolo	Descripción
	Polígono del Proyecto
	Centro Poblado
	Río Permanente
	Quebrada Intermitente

**ESTACIONES DE MONITOREO (PM10)**

Sím bolo	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-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: Octubre 2017  
Distancia Horizontal y Vertical de Grilla: 1,000 metros  
**Escala 1:15,000**









### 4.1.2 Resultados

En el Cuadro 4-2 se presentan los resultados de PM<sub>10</sub> durante los meses de Agosto a Octubre de 2017 y los resultados de laboratorio del análisis gravimétrico de filtros y los cálculos realizados para determinar el PM<sub>10</sub> se presentan en el anexo 12.3.1.

Los valores de PM<sub>10</sub> 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 µg/m<sup>3</sup>).

Cuadro 4-2: Resultados de PM<sub>10</sub>, Proyecto Minero Escobal

Estación	Norma*	Guías*			Línea Base			Resultados		
	USEPA <sup>1</sup>	Banco Mundial <sup>2</sup>	OMS <sup>3</sup>	Promedio	Máximo	Mínimo	Ago-17	Sep-17	Oct-17	
				(µg/m <sup>3</sup> )						
EA-1A	150	150**	50	24.36	89.95	3.67	2.41	16.64	8.32	
EA-1B				NR	NR	NR	24.97	NA	NA	
EA-2A				21.40	76.20	2.74	14.71	3.74	2.91	
EA-3				25.68	78.85	1.25	11.23	8.73	1.66	
EA-3A				NR	NR	NR	12.06	NA	NA	
EA-4A				103.55	120.40	86.70	42.86	NA	NA	
EA-5A				50.73 <sup>¥</sup>	104.80 <sup>¥</sup>	11.80 <sup>¥</sup>	22.46	NA	NA	
EA-6				23.05	57.90	1.70	32.86	NA	NA	
EA-7A				46.48 <sup>¥</sup>	115.90 <sup>¥</sup>	13.40 <sup>¥</sup>	9.98	20.8	9.57	

µg/m<sup>3</sup> = microgramos por metro cúbico. NR = cálculo No Realizado por falta de datos de línea base. NA = No Analizado. <sup>1</sup>USEPA, 2006. Normas nacionales de calidad de aire ambiental (NAAQS), 40 CFR parte 50 (US). <sup>2</sup>Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. <sup>3</sup>Guía de Calidad del Aire, OMS 2005.\* Las normas de calidad de aire ambiental son los niveles de calidad de 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 de 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, 2017.

Los resultados obtenidos durante el trimestre se encontraron entre los 1.66 a 42.86 µg/m<sup>3</sup>. En Septiembre se registró el menor valor de PM<sub>10</sub> en la estación EA-2A (3.74 µg/m<sup>3</sup>), mientras que en Agosto y Octubre se registró en la estación EA-1A y EA-3 (2.41 y 1.66 µg/m<sup>3</sup> respectivamente). El valor más alto de PM<sub>10</sub> durante Agosto se registró en la estación EA-4A (42.86 µg/m<sup>3</sup>), mientras que los valores más altos en Septiembre y Octubre se registraron en la estación EA-7A (20.8 y 9.57 µg/m<sup>3</sup>) respectivamente.

Todos los valores de PM<sub>10</sub> registrados durante el monitoreo trimestral, se encuentran por debajo de los límites máximos establecidos durante el levantamiento de línea base y todos los valores de PM<sub>10</sub> se encuentran por debajo de los valores establecidos por las guías de la OMS (50 µg/m<sup>3</sup>).

## 4.2 Metales en Material Particulado

### 4.2.1 Sitios de Monitoreo

En el Cuadro 4-3 se enlistan las estaciones de monitoreo de metales en material particulado menor o igual a 10 micrómetros ( $PM_{10}$ ) 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 4-1.

Cuadro 4-3: Sitios de monitoreo de metales en  $PM_{10}$ , 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, 2017.

### 4.2.2 Resultados

En el Cuadro 4-4 se presentan los resultados de concentración de metales en  $PM_{10}$  durante el mes de Agosto de 2017. Los resultados de laboratorio del análisis de metales en filtros y los cálculos realizados para determinar el  $PM_{10}$  se presentan en el anexo 12.3.2. La concentración de metales registradas durante Agosto de 2017 se encontraron en el rango de los valores registrados durante los trimestres anteriores, en todas las estaciones de monitoreo.

Cuadro 4-4: Resultados de concentración de metales en PM<sub>10</sub>, Proyecto Minero Escobal (1/2)

Parámetros	Unidades	EA-1B	EA-2A			EA-3A	EA-4A				
		ago-17	Línea Base			ago-17	Línea Base			ago-17	
		3322-0707	Promedio	Máximo	Mínimo	3316-0101	3323-0808	Promedio	Máximo	Mínimo	3318-0303
Aluminio	µg/m <sup>3</sup>	0.2705	0.23	0.28	<0.34	N.D.	N.D.	1.27	1.27	1.27	0
Antimonio		N.D.	<0.10	<0.17	<0.04	N.D.	N.D.	<0.17	<0.17	<0.17	N.D.
Arsénico		N.D.	<0.07	<0.10	<0.03	N.D.	N.D.	<0.10	<0.10	<0.10	N.D.
Azufre		N.D.	1.49	2.17	0.8	N.D.	N.D.	1.23	1.23	1.23	N.D.
Bario		0.0075	0.01	0.01	<0.02	0.0061	0.005	<0.02	<0.02	<0.02	0.0125
Berilio		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Bismuto		N.D.	<0.07	<0.10	<0.03	N.D.	N.D.	<0.1	<0.1	<0.1	N.D.
Boro		0.0329	0.27	0.5	0.03	0.0167	0.014	<0.1	<0.1	<0.1	0.0133
Cadmio		N.D.	<0.02	<0.03	<0.01	N.D.	N.D.	<0.03	<0.03	<0.03	N.D.
Calcio		0.3745	0.65	1.1	0.2	0.1573	0.129	0.78	0.78	0.78	0.316
Cromo		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Cobalto		N.D.				N.D.	N.D.				
Cobre		0.0087				0.0112	0.009				0.005
Estaño		N.D.				N.D.	N.D.				N.D.
Estroncio		N.D.				N.D.	N.D.				N.D.
Fósforo		0.0791				0.0406	N.D.				0.0749
Hierro		0.283	0.26	0.32	0.2	N.D.	N.D.	1.22	1.22	1.22	0.5035
Magnesio		N.D.	0.11	0.14	<0.17	N.D.	N.D.	<0.33	<0.33	<0.33	0.2247
Manganeso		0.0087	0.01	0.01	<0.02	N.D.	0.007	0.09	0.09	0.09	0.0196
Molibdeno		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Níquel		N.D.	<0.03	<0.05	<0.01	N.D.	N.D.	<0.05	<0.05	<0.05	N.D.
Plata		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Plomo		N.D.	<0.03	<0.05	<0.01	N.D.	N.D.	<0.05	<0.05	<0.05	N.D.
Potasio		N.D.	0.55	0.6	0.5	N.D.	N.D.	0.73	0.73	0.73	N.D.
Selenio		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Silicio		2.0391	0.42	0.53	0.3	0.2537	0.416	0.55	0.55	0.55	0.624
Sodio		0.3288	0.53	0.6	0.46	0.1573	0.058	1.4	1.4	1.4	0.4037
Talio		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Titanio		0.0058	0.02	0.02	0.02	0.0046	0.0004	0.09	0.09	0.09	0.0204
Uranio		N.D.	NR	NR	NR	N.D.	N.D.	NR	NR	NR	N.D.
Vanadio		N.D.				N.D.	N.D.				
Zinc		N.D.				N.D.	N.D.				
Zirconio	N.D.	<0.012	<0.02	<0.004	N.D.	N.D.	<0.01	<0.01	<0.01	N.D.	

ND: no detectado. µg/m<sup>3</sup> = microgramos por metro cúbico. Fuente: MSR, 2017.

Cuadro 4-4: Resultados de concentración de metales en PM<sub>10</sub>, Proyecto Minero Escobal (2/2)

Parámetros	Unidades	EA-5A				EA-6				EA-7A				
		Línea Base			ago-17	Línea Base			ago-17	Línea Base			ago-17	
		Promedio	Máximo	Mínimo	3326-1111	Promedio	Máximo	Mínimo	3321-0606	Promedio	Máximo	Mínimo	3324-0997	
Aluminio	µg/m <sup>3</sup>	<0.33	<0.33	<0.33	0.3037	0.31	0.45	<0.33	0.2121	0.45	0.73	<0.33	N.D.	
Antimonio		<0.17	<0.17	<0.17	N.D.	<0.17	<0.17	<0.17	N.D.	<0.17	<0.17	<0.17	N.D.	
Arsénico		<0.1	<0.1	<0.1	N.D.	<0.10	<0.10	<0.10	N.D.	<0.10	<0.10	<0.10	N.D.	
Azufre		<0.42	<0.42	<0.42	N.D.	3.02	4.73	1.3	N.D.	2.28	4.35	<0.42	N.D.	
Bario		<0.02	<0.02	<0.02	0.0112	0.01	0.01	<0.02	0.0062	0.01	0.01	<0.02	0.005	
Berilio		NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	N.D.	
Bismuto		<0.1	<0.1	<0.1	N.D.	<0.10	<0.10	<0.10	N.D.	<0.10	<0.10	<0.10	N.D.	
Boro		<0.1	<0.1	<0.1	0.0129	<0.10	<0.10	<0.10	0.0162	<0.10	<0.10	<0.10	0.022	
Cadmio		<0.03	<0.03	<0.03	N.D.	<0.03	<0.03	<0.03	N.D.	<0.03	<0.03	<0.03	N.D.	
Calcio		1.03	1.03	1.03	0.2371	0.79	1.5	<0.17	0.2038	0.28	0.48	<0.17	0.154	
Cromo					N.D.				N.D.				N.D.	
Cobalto					N.D.				N.D.				N.D.	
Cobre					0.0017				0.0017				0.007	
Estaño		NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	0.096	
Estroncio					N.D.				N.D.				N.D.	
Fósforo					0.0166				0.0125				0.037	
Hierro			0.18	0.18	0.18	0.3037	0.38	0.45	0.3	N.D.	0.31	0.58	<0.08	N.D.
Magnesio			<0.33	<0.33	<0.33	N.D.	3.05	6.02	<0.17	N.D.	0.23	0.38	<0.17	N.D.
Manganeso			<0.02	<0.02	<0.02	0.0116	0.02	0.02	<0.02	0.0058	0.02	0.03	<0.02	0.008
Molibdeno			NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	N.D.
Níquel			<0.05	<0.05	<0.05	N.D.	0.25	0.48	<0.05	N.D.	0.04	0.05	<0.05	N.D.
Plata			NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	N.D.
Plomo			<0.05	<0.05	<0.05	N.D.	<0.05	<0.05	<0.05	N.D.	<0.05	<0.05	<0.05	N.D.
Potasio			<0.5	<0.5	<0.5	N.D.	0.83	1.05	0.6	N.D.	0.8	1.43	<0.33	N.D.
Selenio			NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	N.D.
Silicio			<0.17	<0.17	<0.17	0.5824	0.49	0.58	0.4	2.2879	0.43	0.78	<0.17	0.624
Sodio			<0.08	<0.08	<0.08	0.312	0.07	0.1	<0.08	0.2205	1.27	2.5	<0.08	0.087
Talio			NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	N.D.
Titanio			<0.02	<0.02	<0.02	0.01	0.02	0.03	<0.02	0.0017	0.02	0.03	<0.02	0.0008
Uranio						N.D.				N.D.				N.D.
Vanadio			NR	NR	NR	N.D.	NR	NR	NR	N.D.	NR	NR	NR	N.D.
Zinc						N.D.				N.D.				N.D.
Zirconio			<0.01	<0.01	<0.01	N.D.	0.01	0.01	<0.02	N.D.	<0.02	<0.02	<0.02	N.D.

ND: no detectado. µg/m<sup>3</sup> = microgramos por metro cúbico. Fuente: MSR, 2017.

### 4.3 Partículas Sedimentables Totales (PST)

#### 4.3.1 Sitios de Monitoreo

En el Cuadro 4-5 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 4-2.

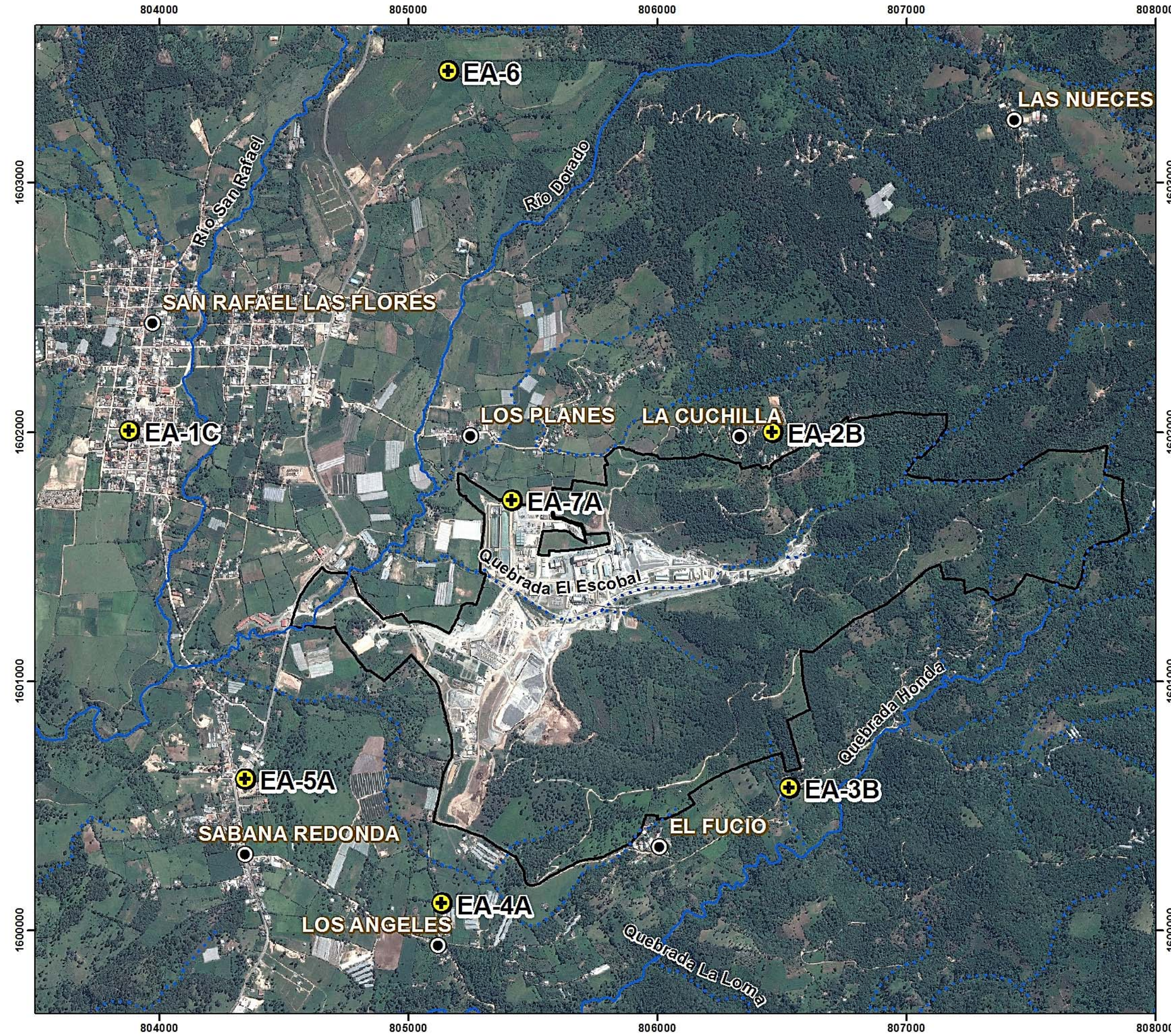
Cuadro 4-5: Sitios de Monitoreo de PST, Proyecto Minero Escobal

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 WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2017.







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

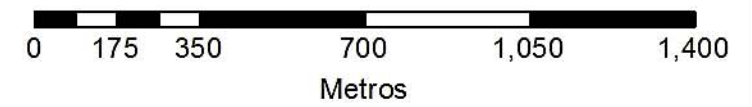
Símbolo	Estación	X	Y
	EA-1C	803881	1602004
	EA-2B	806464	1601999
	EA-3B	806532	1600570
	EA-4A	805136	1600106
	EA-5A	804346	1600607
	EA-6	805162	1603450
	EA-7A	805419	1601726

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: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:16,000









### 4.3.2 Resultados

En el Cuadro 4-6 se presentan los resultados de Partículas Sedimentables Totales (PST) realizado durante Septiembre de 2017. El resumen del informe de resultados presentado por el contratista se presenta en el anexo 12.3.3.

Los valores de PST se encuentran entre 0.94 a 51.40 g/(m<sup>2</sup> x 30 días), los cuales corresponden a las estaciones EA-6 y EA-1C respectivamente. Los valores registrados para las estaciones EA-4A y EA-A se encuentran dentro de los valores mínimos y máximos registrados durante el establecimiento de la línea base. Las estaciones EA-1C, EA-2B, EA-3B, EA-6 y EA-7A no cuentan con línea base. Sin embargo los valores registrados se encuentran dentro del rango de lo reportado en los anteriores trimestres.



Cuadro 4-6: 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 <sup>1</sup>	Banco Mundial <sup>2</sup> OMS <sup>3</sup>	Sep-17	Sep-17	Sep-17	Línea Base		Muestreo	Línea Base			Muestreo	Sep-17	Sep-17	
						Promedio	Mínimo	Máximo	Sep-17	Promedio	Mínimo	Máximo			Sep-17
	<b>g/(m<sup>2</sup> x 30 días)</b>														
Sólidos insolubles	ND	ND	48.90	0.12	2.46	6.27	2.60	10.80	3.33	6.50	0.80	16.00	8.64	0.13	3.14
Sólidos solubles			2.50	0.30	0.74	2.12	0.90	2.90	3.93	11.26	2.00	37.00	4.85	0.81	3.53
Sólidos totales			51.40	0.42	3.19	8.37	4.60	13.00	7.26	17.58	3.20	50.00	13.49	0.94	6.67

<sup>1</sup>USEPA, 2006. Normas nacionales de calidad de aire ambiental (NAAQS), 40 CFR parte 50 (US). <sup>2</sup>Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. <sup>3</sup>Guía de Calidad del Aire, OMS 2005. ND: estas normas y guías no establecen un límite para estos parámetros. g/(m<sup>2</sup> x 30 días)= gramos por metro cuadrado durante 30 días. Fuente: MSR, 2017.



## 4.4 Gases de Combustión (SO<sub>2</sub> y NO<sub>2</sub>)

### 4.4.1 Sitios de Monitoreo

En el Cuadro 4-7 se enlistan las estaciones de monitoreo de dióxido de azufre (SO<sub>2</sub>) y de dióxido de nitrógeno (NO<sub>2</sub>) ubicada en el área de influencia (AI) del Proyecto. La ubicación de las estaciones de monitoreo de SO<sub>2</sub> y NO<sub>2</sub> se presenta en la Figura 4-3.

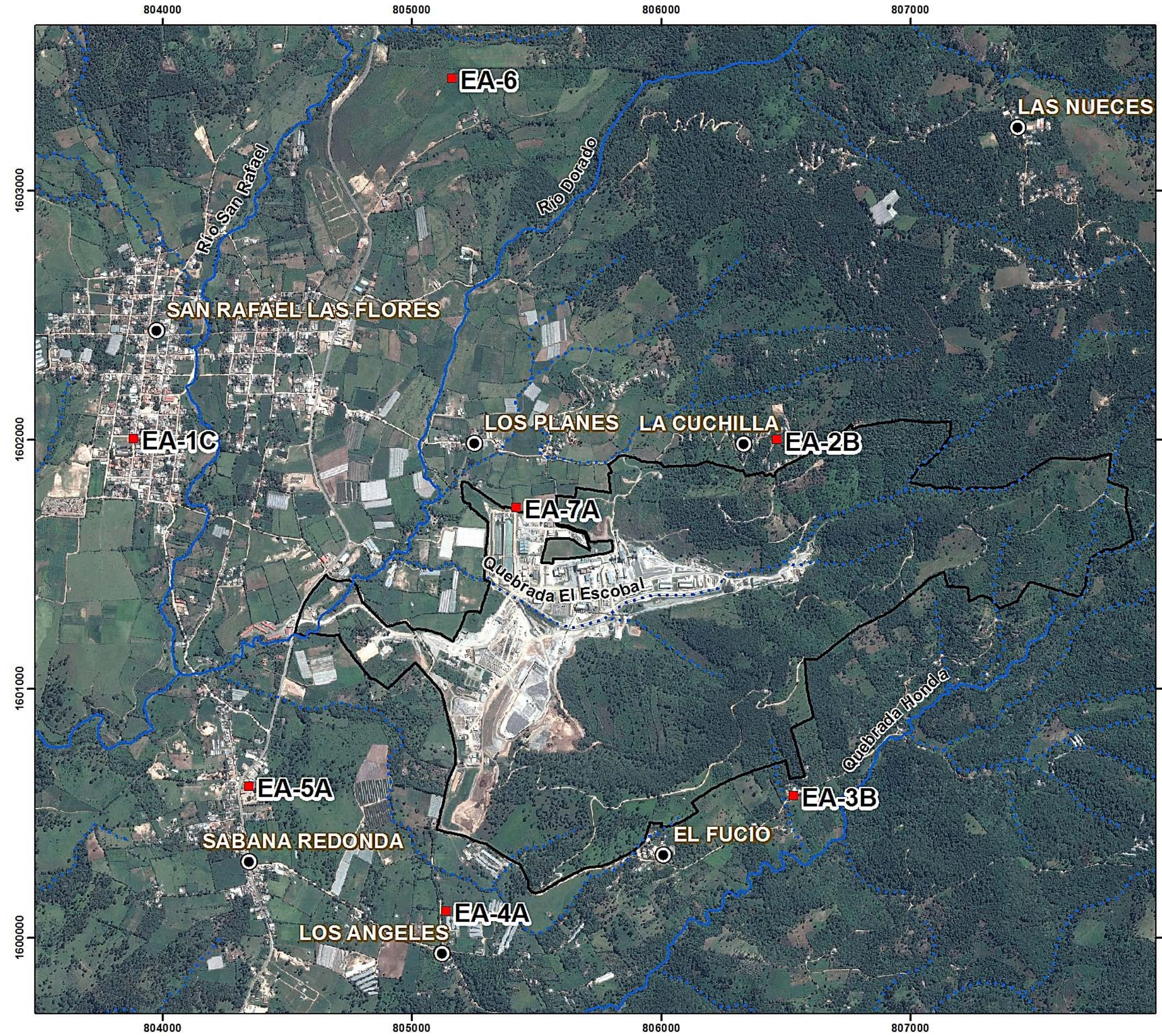
Cuadro 4-7: Sitios de Monitoreo de SO<sub>2</sub> y NO<sub>2</sub>, Proyecto Minero Escobal

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 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	Julio 2010 a Abril 2011
EA-6	805,168	1,603,247	1,434	Al norte del Proyecto, ruta a Mataquesuintla	No cuenta con línea base
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	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, 2017.







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

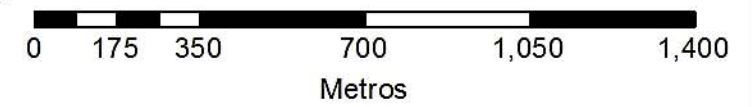
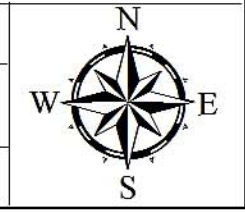
Simbolo	Estación	X	Y
	EA-1C	803881	1602004
	EA-2B	806464	1601999
	EA-3B	806532	1600570
	EA-4A	805136	1600106
	EA-5A	804346	1600607
	EA-6	805162	1603450
	EA-7A	805419	1601726

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000  
Hojas catográficas año 2010 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: Octubre 2017

Distancia Horizontal y Vertical  
de Grilla: 1,000 metros

Escala 1:16,000









#### 4.4.2 Resultados

En el Cuadro 4-8 se presentan los resultados de las mediciones de SO<sub>2</sub> y NO<sub>2</sub> realizadas en siete estaciones de monitoreo de Calidad de Aire. El informe de resultados presentado por el contratista se presenta en el anexo 12.3.3.

En las mediciones efectuadas durante este trimestre se obtuvieron valores por debajo del límite de detección del método en todas las estaciones para SO<sub>2</sub> (<13µg/m<sup>3</sup>). Se registró un solo valor por arriba del límite de detección del método para NO<sub>2</sub> en la estación EA-2B y fue de 9µg/m<sup>3</sup>. Todos los valores registrados de SO<sub>2</sub> y de NO<sub>2</sub> son menores a los valores guías establecidos por el Banco Mundial, la OMS, British Columbia y los valores norma establecidos por la USEPA. Lo que indica que las actividades realizadas durante el presente período, no han originado variaciones en los parámetros reportados en los trimestres anteriores.



Cuadro 4-8: 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 <sup>1</sup>	Banco Mundial <sup>2</sup>	OMS <sup>3</sup>					British Columbia <sup>4</sup>	Línea base**			Muestreo	Línea base**			
	Promedio				Mínimo	Máximo	Promedio	Mínimo		Máximo							
					Sep-17	Sep-17	Sep-17	Sep-17	(µg/m <sup>3</sup> )			Sep-17	Sep-17			Sep-17	
SO <sub>2</sub>	370	20	20	160	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
NO <sub>2</sub>	100 <sup>¥</sup>	40 <sup>¥</sup>	40 <sup>¥</sup>	200	<9	9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9

Nota: µg/m<sup>3</sup> = microgramos por metro cúbico; SO<sub>2</sub>= dióxido de azufre, NO<sub>2</sub>= dióxido de nitrógeno. <sup>1</sup>Guía USEPA, 2006. Normas nacionales de calidad de aire ambiental (NAAQS), 40 CFR parte 50 (US). <sup>2</sup>Guías Generales sobre Medio Ambiente, Salud y Seguridad, Corporación Financiera Internacional, Grupo del Banco Mundial 2007. <sup>3</sup>Guía de Calidad del Aire, OMS 2005. <sup>4</sup>Guías 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, 2017.



## 4.5 Niveles de Presión Sonora

### 4.5.1 Sitios de Monitoreo

En el Cuadro 4-9 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 4-4.

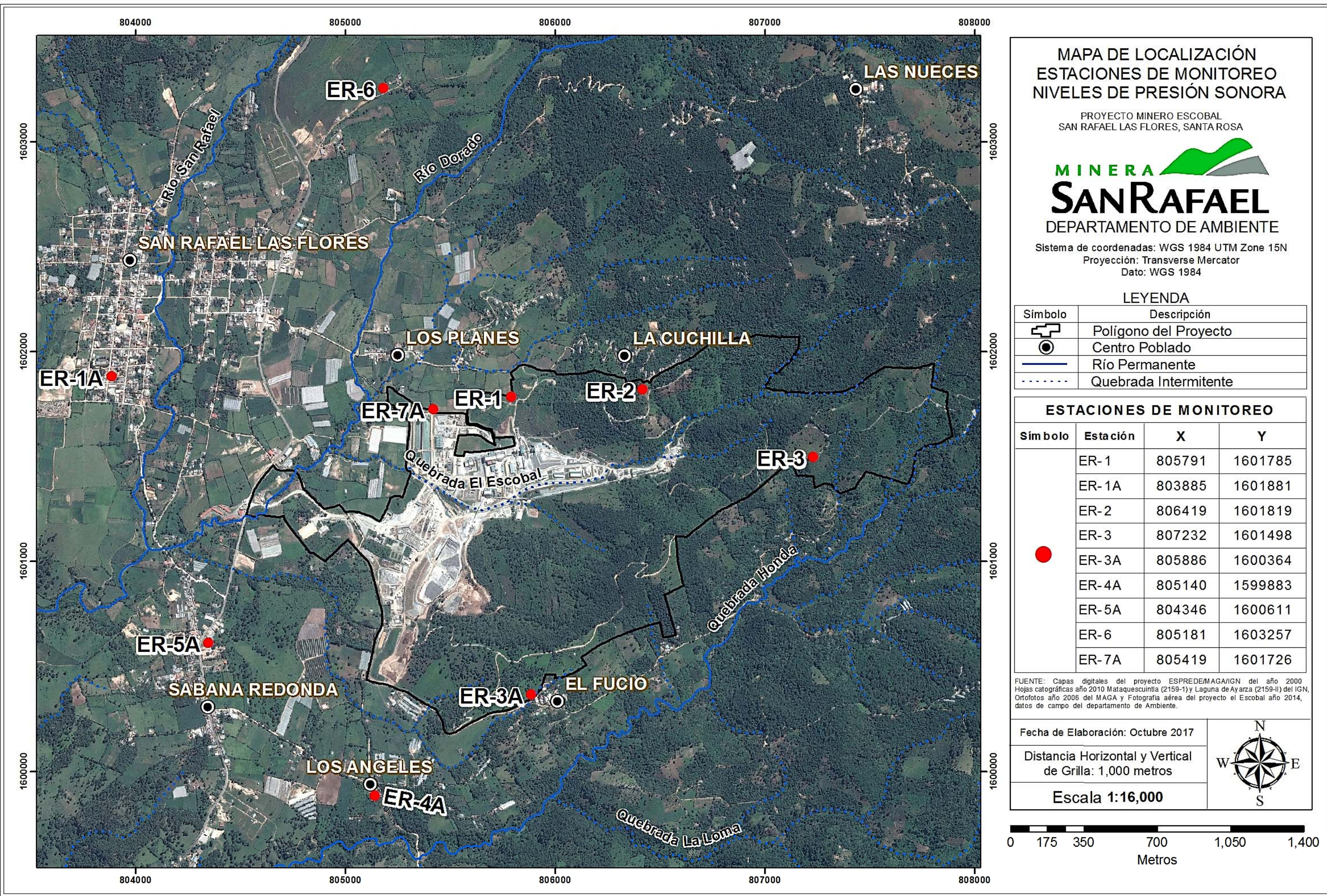
Cuadro 4-9: Sitios de Monitoreo de Presión Sonora, Proyecto Minero Escobal

Estación	Coordenadas		Altitud (msnm)	Sitio
<b>Periodicidad de monitoreo mensual</b>				
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
<b>Periodicidad de monitoreo trimestral</b>				
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 Mataquescuintla

Sistema de coordenadas proyectadas UTM, DATUM WGS84. Msnm: metros sobre el nivel del mar. Fuente: MSR, 2017.







**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**

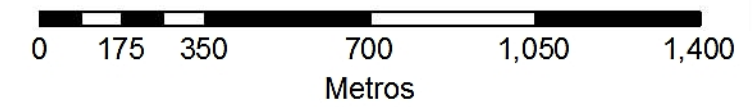
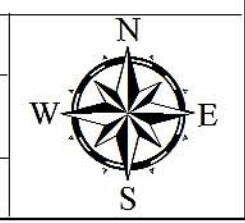
Símbolo	Estación	X	Y
	ER-1	805791	1601785
	ER-1A	803885	1601881
	ER-2	806419	1601819
	ER-3	807232	1601498
	ER-3A	805886	1600364
	ER-4A	805140	1599883
	ER-5A	804346	1600611
	ER-6	805181	1603257
	ER-7A	805419	1601726

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catastrales 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: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:16,000









#### 4.5.2 Resultados

En el Cuadro 4-10 y en el Cuadro 4-11 se presentan los valores registrados de los niveles de presión sonora (**NPS**) durante los meses de Agosto a Octubre de 2017. Los informes generados por los equipos de medición se presentan en el anexo 12.3.4.

Los resultados obtenidos de NPS en las estaciones muestreadas respecto al parámetro Leq, están dentro del rango de 39.5 dBa y 53.2 dBa, los cuales corresponden a las estaciones ER-3 y ER-7A respectivamente.

La estación ER-2 presentó el menor promedio diurno (44.2 dBa) y el menor promedio nocturno (40.3 dBa) se registró en la estación ER-6; mientras que la estación ER-7A presentó el mayor promedio diurno (53.9 dBa) y el mayor promedio nocturno (53.2 dBa) durante el trimestre.

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 de ER-7A durante las mediciones de octubre para promedio diurno y las mediciones de agosto y septiembre para promedio nocturno. Las estaciones ER-1A, ER-3A y ER-6 no cuentan con datos de línea base.

Los promedios diurnos registrados durante los meses de Agosto a Octubre de 2017 estuvieron por debajo de la guía establecida por la OMS, Banco Mundial y USEPA para zonas residenciales. Los promedios nocturnos registrados estuvieron por debajo de la norma establecida por la USEPA (55 dBa).

Ninguna de las estaciones monitoreadas presentó valores promedio diurno y nocturno superiores al valor de la guía para jornada diurna y nocturna del Banco Mundial para zonas industriales (70 dBa).



Cuadro 4-10: Resultados trimestrales de los niveles de presión sonora, Proyecto Minero Escobal

Parámetro	Norma*		Guías*		ER-1						ER-2									
	USEPA <sup>1</sup>	OMS <sup>2</sup>	Banco Mundial <sup>3</sup>		Línea Base			Ago-17	Sep-17	Oct-17	Línea Base			Ago-17	Sep-17	Oct-17				
			Residencial	Industrial	Promedio	Máximo	Mínimo				Promedio	Máximo	Mínimo							
			dBA																	
Lmin	NL	NL	NL	NL	89.3	99.5	64.6	29.9	29.8	32.5	86.7	97.8	64.9	32.3	36	33.7				
Lmax					32.5	37.7	27.0	88.9	95.2	70.9	35.2	42.8	26.5	70.0	90.5	84.5				
Leq					49.9	57.1	41.2	50.1	50	47.7	49.4	58.7	39.7	43.3	50.4	45.9				
PD					55	55	55	70	50.5	59.1	39.7	47.3	51.8	47.7	48.8	57.1	39.8	44.2	51.6	47.1
PN					55	50	45	70	47.6	55.7	39.3	52.7	41.8	47.9	46.6	54.5	37.9	41.3	47.5	42.9

Parámetro	Norma*		Guías*		ER-3						ER-7A									
	USEPA <sup>1</sup>	OMS <sup>2</sup>	Banco Mundial <sup>3</sup>		Línea Base			Ago-17	Sep-17	Oct-17	Línea Base**			Ago-17	Sep-17	Oct-17				
			Residencial	Industrial	Promedio	Máximo	Mínimo				Promedio	Máximo	Mínimo							
			dBA																	
Lmin	NL	NL	NL	NL	87.4	100.7	67.2	28.8	32.1	43.9	87.5	89.0	82.1	92.5	81.1	80.2				
Lmax					49.4	56.2	26.9	76.4	76.3	65.9	NR	NR	NR	46.3	39.3	39.3				
Leq					56.8	63.2	39.7	39.5	48.5	45.7	52.8	54.5	50.9	53.2	52	52.7				
PD					55	55	55	70	56.5	63.1	41.0	48.0	49.3	46.1	52.1	53.5	50.4	53.5	51.1	53.9
PN					55	50	45	70	57.2	64.0	34.1	44.2	47.1	45.1	49.7	50.9	48.8	53	53.2	49.3

\*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. <sup>1</sup>Guía USEPA, 2006. Normas nacionales de niveles de presión sonora. <sup>2</sup>Guías sobre ruido comunitario, OMS 1999. <sup>3</sup>Guías 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. \*\* Los valores de línea base corresponden a la estación ER-7. Fuente: MSR, 2017.



Cuadro 4-11: Resultados mensuales de los niveles de presión sonora, Proyecto Minero Escobal

Parámetro	Norma*		Guías*		ER-1A				ER-3A				ER-4A				
	USEPA <sup>1</sup>	OMS <sup>2</sup>	Banco Mundial <sup>3</sup>		Línea Base			Ago-17	Línea Base			Ago-17	Línea Base			Ago-17	
			Residencial	Industrial	Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
			dBA														
Lmin								35.9					30.9	80.6	78.2	82.1	43.6
Lmax	NL	NL	NL	NL				86.1					94	NR	NR	NR	83
Leq					NR	NR	NR	51.4	NR	NR	NR		49.9	50.2	49.3	50.9	49.1
PD	55	55	55	70				52.8					50.6	49.5	48.4	50.4	49.3
PN	55	50	45	70				47.4					48.5	48.6	48.2	48.9	48.8

Parámetro	Norma*		Guías*		ER-5A				ER-6				
	USEPA <sup>1</sup>	OMS <sup>2</sup>	Banco Mundial <sup>3</sup>		Línea Base			Ago-17	Línea Base			Ago-17	
			Residencial	Industrial	Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
			dBA										
Lmin					91.6	85.1	92.2	35					34.2
Lmax	NL	NL	NL	NL	NR	NR	NR	78					84.9
Leq					65.8	51.6	67.6	50	NR	NR	NR		48.8
PD	55	55	55	70	61.2	50.2	63.8	51.3					50.7
PN	55	50	45	70	62.8	45.9	65.0	46.9					40.3

\*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. <sup>1</sup>Guía USEPA, 2006. Normas nacionales de niveles de presión sonora. <sup>2</sup>Guías sobre ruido comunitario, OMS 1999. <sup>3</sup>Guías 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, 2017.

## 5 Calidad del Agua

### 5.1 Sitios de Monitoreo

En el Cuadro 5-1 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 5-1, Figura 5-2, Figura 5-3 y Figura 5-4.

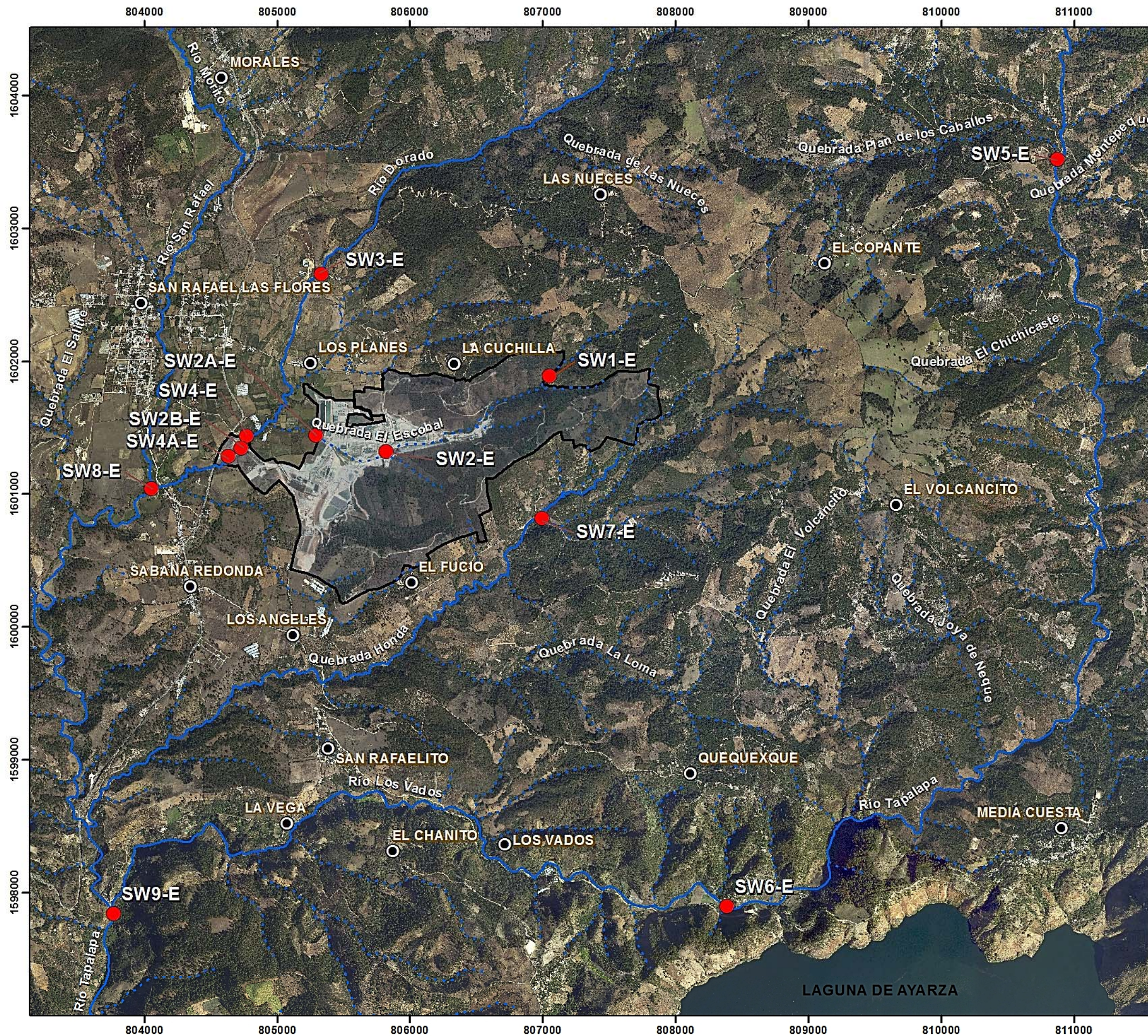
Cuadro 5-1: Sitios de Monitoreo de Calidad de Agua, Proyecto Minero Escobal

Estación	Coordenadas		Sitio	Período Línea Base
<b>Agua Superficial</b>				
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)	
<b>Agua Subterránea, Nacimientos</b>				
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
<b>Agua Subterránea, Pozos de monitoreo</b>				
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
<b>Agua Subterránea, pozo de producción</b>				
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
<b>Agua de grifo</b>				
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, 2017.





# 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

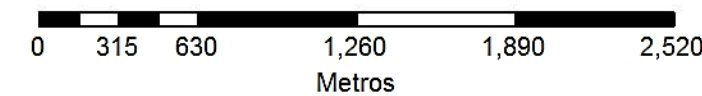
Símbolo	Estación	X	Y
	SW 1-E	807047	1601885
	SW 2-E	805805	1601367
	SW 2A-E	805289	1601433
	SW 2B-E	804728	1601341
	SW 3-E	805331	1602656
	SW 4-E	804775	1601431
	SW 4A-E	804623	1601255
	SW 5-E	810876	1603516
	SW 6-E	808385	1597892
	SW 7-E	806995	1600815
	SW 8-E	804048	1601037
	SW 9-E	803766	1597838

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 2013,  
datos de campo del departamento de Ambiente.

Fecha de Elaboración: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

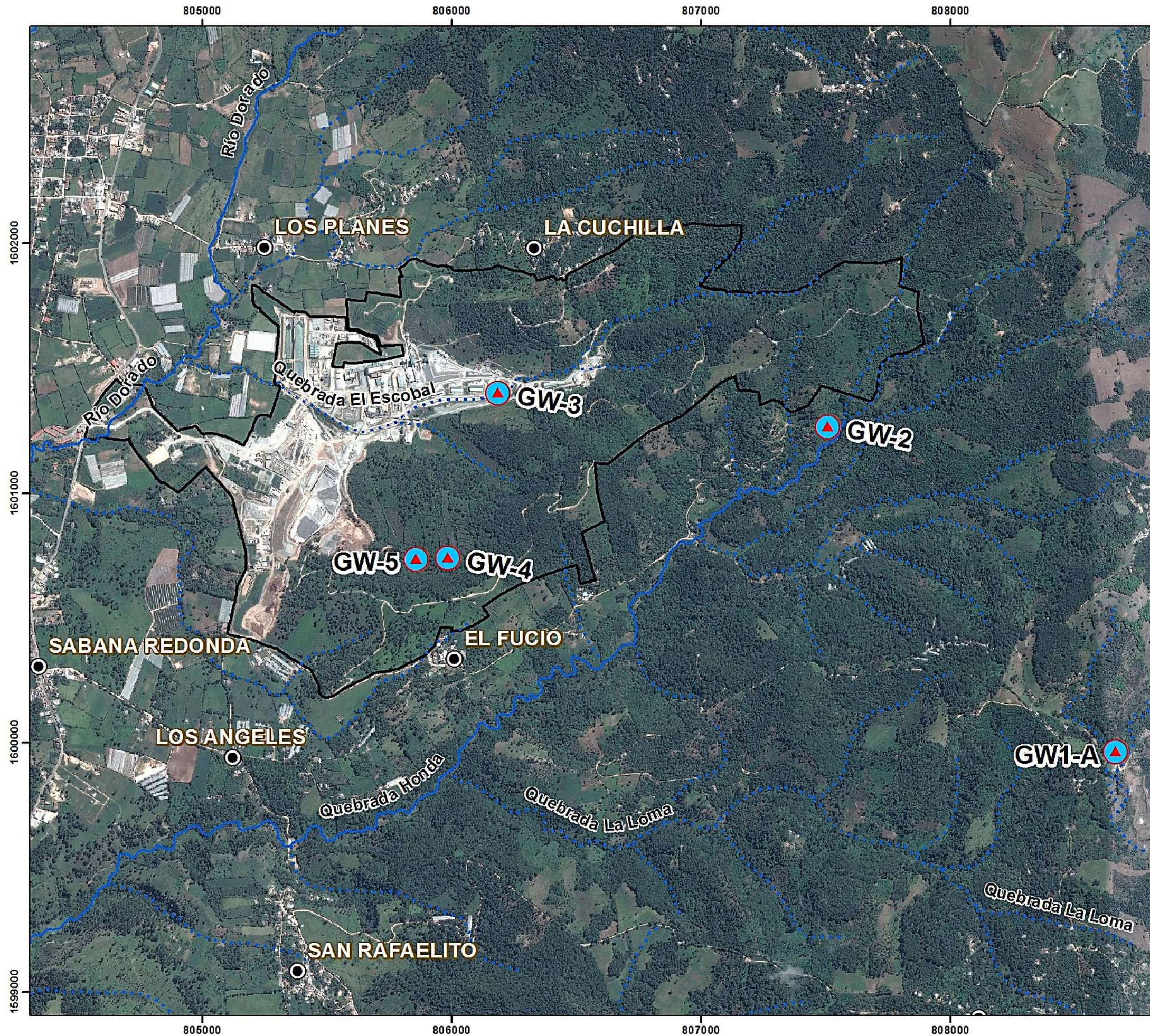
Escala 1:30,000











MAPA DE LOCALIZACIÓN  
ESTACIONES DE MONITOREO  
CALIDAD DE AGUA SUBTERRÁNEA

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 (POZOS)

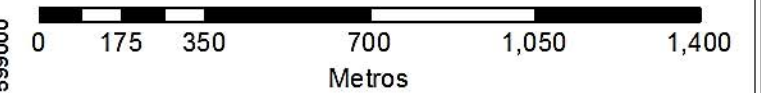
Sim bolo	Estación	X	Y
	GW-1A	808664	1599957
	GW-2	807509	1601262
	GW-3	806187	1601397
	GW-4	805986	1600736
	GW-5	805858	1600731

FUENTE: Capas digitales del proyecto ESPREDEMAGA/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: Octubre 2017

Distancia Horizontal y Vertical  
de Grilla: 1,000 metros

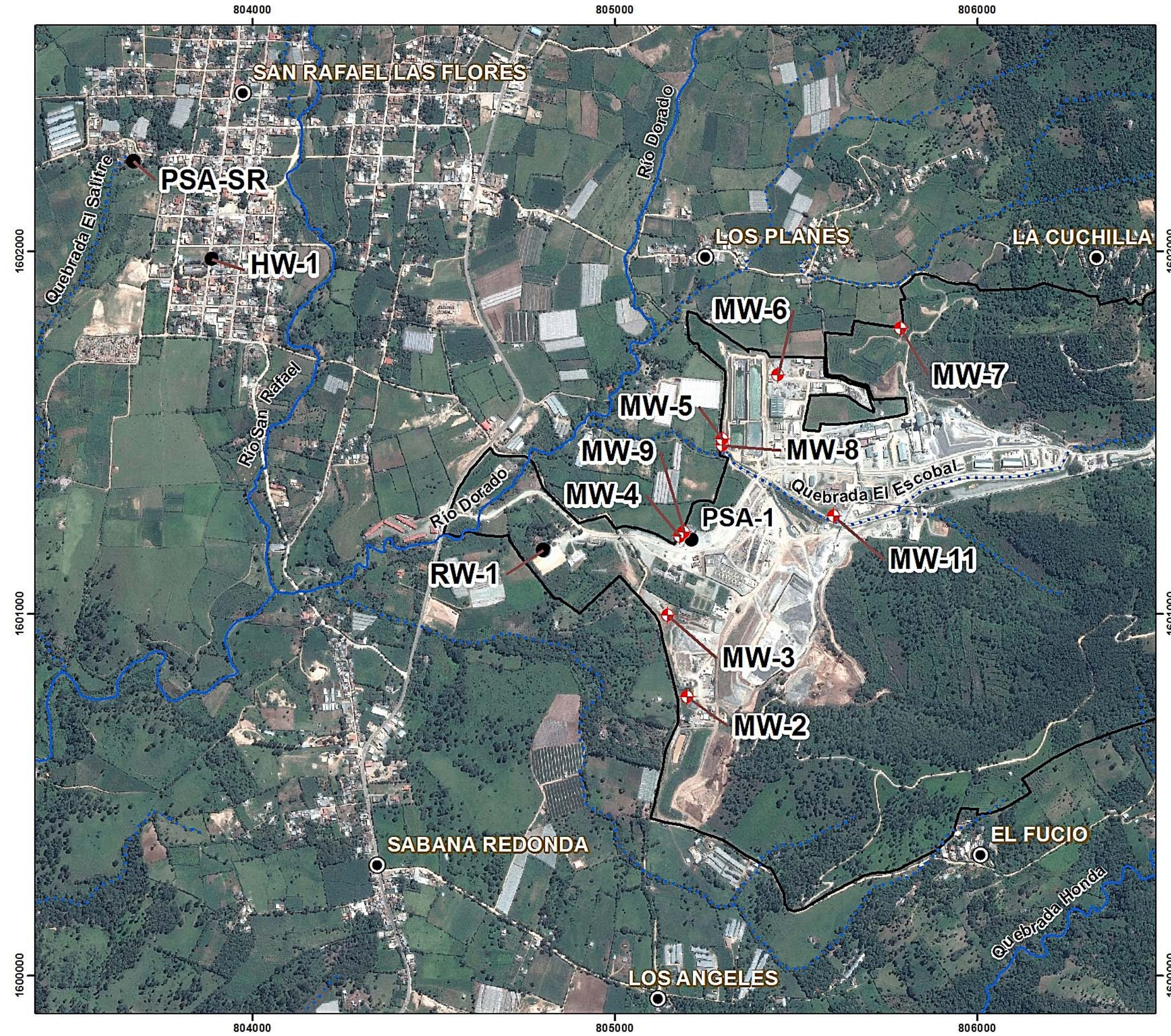
Escala 1:16,000











# 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)

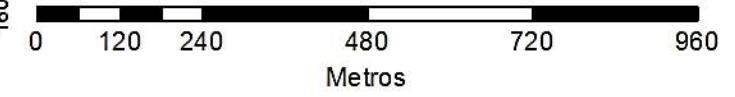
Símbolo	Estación	X	Y
	MW-2	805201	1600768
	MW-3	805148	1600993
	MW-4	805181	1601212
	MW-5	805299	1601463
	MW-6	805452	1601657
	MW-7	805791	1601785
	MW-8	805298	1601480
	MW-9	805192	1601222
	MW-11	805607	1601267
		RW-1	804803
PSA-SR		803672	1602247
HW-1		803888	1601977
PSA-1		805212	1601203

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000  
Hojas catográficas año 2010 Mataquescuintla (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: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

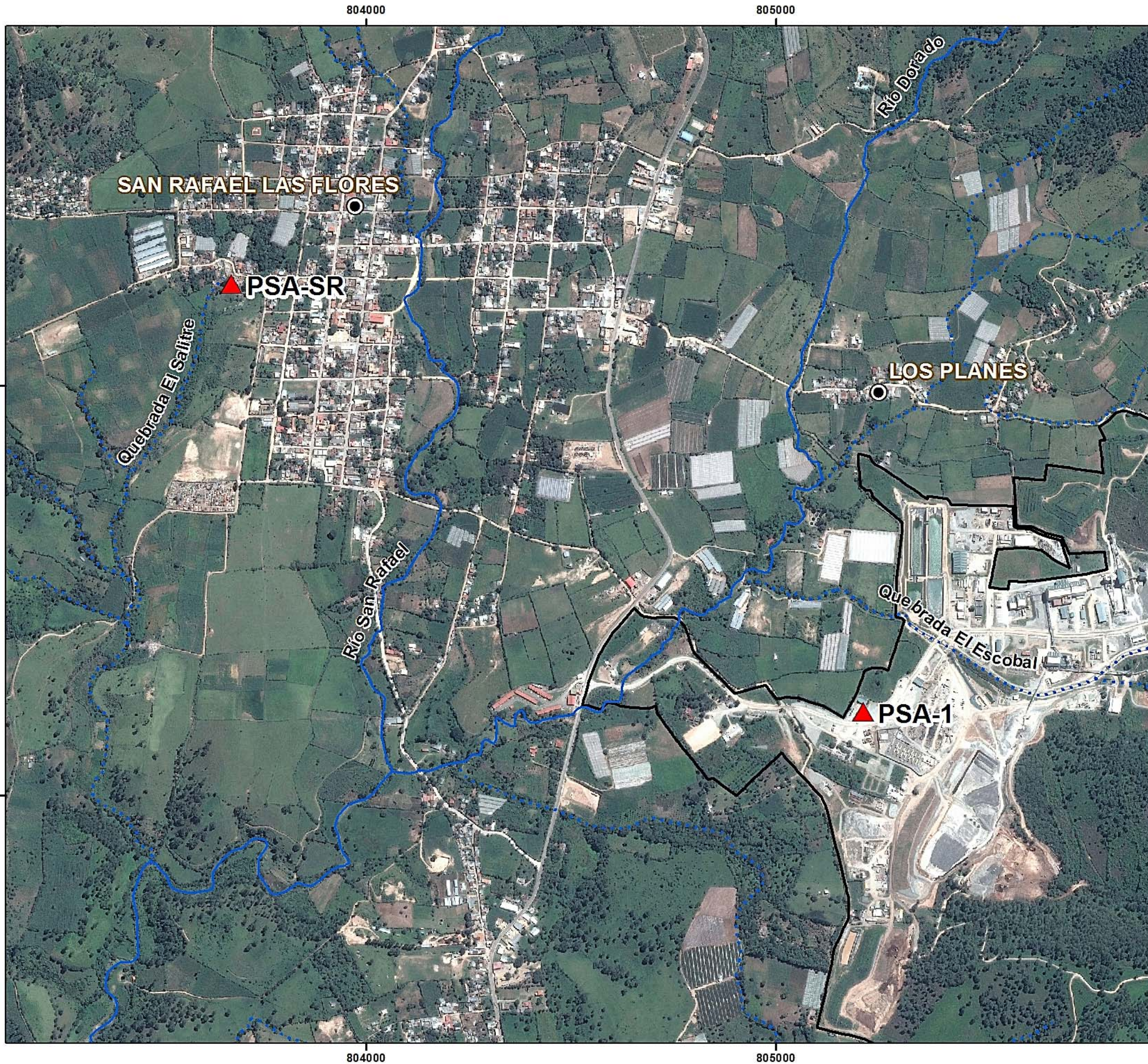
Escala 1:11,000











# 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

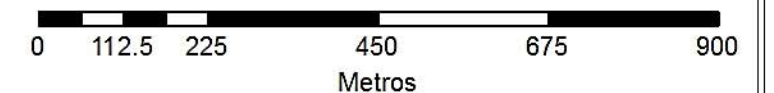
Símbolo	Estación	X	Y
	PSA-1	805212	1601203
	PSA-SR	803672	1602247

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 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: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:10,000







## 5.2 Resultados

### 5.2.1 Control de Calidad

En el monitoreo correspondiente al mes de Septiembre 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 5-2.

En las tres muestras del control de calidad de los blancos de campo, se detectaron concentraciones mínimas de aluminio disuelto y total (GW10 y SW10), cromo total (SW10), bario disuelto (MW20), boro disuelto (GW10), calcio disuelto (GW10 y MW20), cobalto disuelto (SW10), manganeso total (SW10), níquel total (SW10), estroncio disuelto (GW10), nitrógeno kjeldahl (SW10) y sulfatos (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 5-2: 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	<1.8	<1.8	<1.8	1.30E+03	7.00E+01	23	2.30E+01	<1.8	<1.8
Color Real	U Pt/Co	<1	<1	<1	8	2	<1	<1	4	5
Materia flotante	U Pt/Co					Ausente		Ausente		Ausente
Aluminio Disuelto	mg/L	<0.03	0.03	<0.03	<0.03	0.03	0.04	0.05	<0.03	<0.03
Aluminio Total		0.04	NA	NA	0.18	0.15	NA	NA	NA	NA
Antimonio Disuelto		<0.0004	<0.0004	<0.0004	0.0071	0.0068	<0.0004	<0.0004	<0.0004	<0.0004
Antimonio Total		<0.0004	NA	NA	0.0067	0.0065	NA			
Arsénico Disuelto		<0.0002	<0.0002	<0.0002	0.0067	0.0066	0.002	0.002	0.0006	0.0006
Arsénico Total		<0.0002	NA	NA	0.0073	0.007	NA			
Bario Disuelto		<0.003	<0.003	0.003	0.065	0.065	0.086	0.085	0.060	0.060
Bario Total		<0.003	NA	NA	0.065	0.065	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	0.07	0.07	0.02	0.02	0.03	0.03
Boro Total		<0.01	NA	NA	0.09	0.08	NA			
Cadmio Disuelto		<0.0001	<0.0001	<0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Cadmio Total		<0.0001	NA	NA	0.0003	0.0003	NA			
Calcio Disuelto		<0.1	0.1	0.5	188	187	45.1	45.3	71.8	71.7



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
Calcio Total	mg/L	<0.1	NA	NA	209	217	NA			
Cromo Disuelto		<0.01	<0.01	<0.01	<0.01	<0.01	<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	6.01	6.01
Hierro Total		<0.02	NA	NA	0.09	0.10	NA			
Plomo Disuelto		<0.0001	<0.0001	<0.0001	0.0002	0.0002	<0.0001	<0.0001	0.0001	0.0001
Plomo Total		<0.0001	NA	NA	0.005	0.0051	NA			
Litio Disuelto		<0.008	<0.008	<0.008	0.040	0.044	<0.008	<0.008	0.014	0.013
Litio Total		<0.008	NA	NA	0.050	0.044	NA			
Magnesio Disuelto		<0.2	<0.2	<0.2	13.7	13.7	10.0	10.1	11.1	11.1
Magnesio Total		<0.2	NA	NA	15.1	15.7	NA			
Manganeso Disuelto		<0.005	<0.005	<0.005	0.133	0.130	0.005	<0.005	0.209	0.206
Manganeso Total		0.005	NA	NA	0.17	0.171	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	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Molibdeno Total		<0.02	NA	NA	<0.02	<0.02	NA			
Níquel Disuelto		<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
Níquel Total		0.011	NA	NA	0.009	<0.008	NA			
Potasio Disuelto		<0.2	<0.2	<0.2	7.0	7.1	7.9	7.9	4.9	5.0
Potasio Total		<0.2	NA	NA	7.4	7.6	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	0.0006	0.0006	0.0004	0.0003	<0.0001	<0.0001
Selenio Total		<0.0001	NA	NA	0.0007	0.0007	NA			
Plata Disuelta		<0.00005	<5x10 <sup>-5</sup>	<5x10 <sup>-5</sup>	<0.00005	<0.00005	<5x10 <sup>-5</sup>	<5x10 <sup>-5</sup>	<5x10 <sup>-5</sup>	<5x10 <sup>-5</sup>
Plata Total		<0.00005	NA	NA	0.0001	0.00011	NA			
Sodio Disuelto		<0.2	<0.2	<0.2	37.1	37.1	17.6	17.7	27.6	27.7
Sodio Total		<0.2	NA	NA	41.5	42.3	NA			
Estroncio Disuelto		<0.005	0.006	<0.005	2.08	2.09	0.246	0.248	0.537	0.538
Estroncio Total		<0.005	NA	NA	2.32	2.42	NA			
Talio Disuelto		<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Talio Total		<0.0001	NA	NA	0.0001	0.0001	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	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	
Titanio Total	<0.005	NA	NA	0.013	<0.005	NA				
Uranio Disuelto	<0.0001	<0.0001	<0.0001	0.0003	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	
Uranio Total	<0.0001	NA	NA	0.0003	0.0003	NA				
Vanadio Disuelto	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	
Vanadio Total	0.008	NA	NA	0.006	<0.005	NA				
Zinc Disuelto	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Zinc Total	<0.01	NA		<0.01	<0.01	NA				
Grasas y Aceites	<2.1	NA		<2.2	<2.2	NA				
DQO	<10	NA		<10	<10	NA				
Cloruros	<0.5	<0.5	<0.5	34.5	34.3	10.8	10.7	14.1	13.9	
Cianuro Total	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	

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
Fluoruros	mg/L	<0.05	<0.05	<0.05	0.64	0.65	0.20	0.20	0.86	0.84
Nitratos/Nitritos como N		<0.02	<0.02	<0.02	1.65	1.64	3.22	3.21	<0.02	<0.02
Amonio		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrógeno Kjeldahl (TKN)		0.1	<1	<1	<0.1	<0.1	<0.1	<1	<1	<1
Fosfatos		<0.06	<0.06	<0.06	<0.06	0.06	<0.06	<0.06	0.06	<0.06
Fósforo Disuelto (Orto)		<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02
Fósforo Total		<0.02	<0.02	<0.02	0.02	0.02	0.02	0.02	0.04	0.04
STD (TDS)		<10	<10	<10	950	950	334	346	398	414
SST (TSS)		<5	<5	<5	<5	<5	<5	<5	30.0	28.0
ST (TS)		<10	<10	<10	974	984	372	374	430	450
Sulfatos		1.2	<1	3.2	489	479	144	110	127	129.0
Alcalinidad Total		<2	<2	<2	69.9	70.3	63.5	63.1	139	139
Hidrocarburos totales (TPH)		<0.09	NA		<0.09	<0.09	NA			

u.e.: unidades exponenciales. mg/L: miligramos por litro. NMP/100ml: número más probable en 100ml. u Pt/Co: unidades platino cobalto. NA: no analizado. Fuente: MSR, 2017.

### 5.2.2 Agua Superficial

En el Cuadro 5-3 se presentan los resultados de la calidad del agua superficial para el mes de Septiembre 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 12.5.1.

Las estaciones muestreadas presentaron un pH levemente alcalino (7.12 a 8.34 u.e.). En ninguna de las estaciones se detectaron valores de grasas y aceites, 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, a excepción de lo registrado en SW8-E. La Demanda Química de Oxígeno (**DQO**) se detectó en las estaciones SW3-E, SW4A-E, SW8-E y SW9-E en concentraciones entre 14-47 mg/L, y no sobrepasaron el valor guía establecido por el Banco Mundial (125 mg/L). En ninguna estación se detectó concentración alguna de Demanda Bioquímica de Oxígeno (**DBO**).

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), y dentro de los valores establecidos durante el levantamiento de línea base, a excepción de las estación SW8-E.

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 las estaciones SW4-E para ambos parámetros.

40

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 seis estaciones, excepto en SW1-W, SW3-E, SW5-E, SW6-E y SW9-E, y se detectó en un rango de concentración de 0.0005 – 0.0065 mg/L, 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). En ninguna estación de monitoreo de agua superficial fue detectado Cianuro y Mercurio. Y en todas las estaciones fue detectado el Plomo Total, 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 5-3: 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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					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	8.08	7.42	6.56	7.87	8.34				8.33
Temperatura (campo)	°C				17.4	13	19.8	20.3	22.4	20.3	25.6	22.4				27.2
Conductividad (campo)	µS/cm				277.9	66.3	566.6	257.1	807.3	177.3	1965	285.1				1154
Oxígeno disuelto (campo)					3.6	0.1	6.4	7.26	4.76	3.5	5.8	7.48				7.16
Cr VI	mg/L							<0.05				<0.05				<0.05
DBO								<10				<10				<10
Coliformes Fecales	NMP/100ml							7.00E+02				2.40E+02				7.00E+01
Color Real	U Pt/Co				NR	NR	NR	10	NR	NR	NR	5				2
Materia Flotante								Ausente				Ausente				Ausente
Turbidez	NTU							28.6				11.10				9.65
Aluminio Disuelto					0.035	<0.03	0.09	<0.03	0.043	<0.03	0.12	<0.03				0.03
Aluminio Total		0.2			5.02	<0.03	35.1	1.91	2.35	0.06	8.77	0.88				0.15
Antimonio Disuelto					<0.0004	<0.0004	0.0006	<0.0004	<0.0004	<0.0004	<0.0004	0.0005				0.0068
Antimonio Total		0.006			<0.0004	<0.0004	0.0007	<0.0004	<0.0004	<0.0004	0.0005	0.0005				0.0065
Arsénico Disuelto					0.00216	0.0005	0.0034	0.0009	0.00184	0.0013	0.0024	0.0023				0.0066
Arsénico Total		0.01		0.1	0.00339	0.0015	0.0094	0.0012	0.00266	0.0012	0.0054	0.0025				0.007
Bario Disuelto					0.1361	0.086	0.207	0.085	0.109	0.088	0.133	0.083				0.065
Bario Total		1			0.186	0.1	0.434	0.107	0.131	0.096	0.186	0.091				0.065
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	<0.01	0.114	<0.01	0.29	0.01				0.07
Boro Total					<0.01	<0.01	0.02	0.04	0.11	<0.01	0.28	0.01				0.08
Cadmio Disuelto					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	NR	NR	NR	0.0002
Cadmio Total		0.003		0.1	<0.0001	<0.0001	0.0007	<0.0001	<0.0001	<0.0001	0.0001	<0.0001				0.0003
Calcio Disuelto					45.2	18.9	74.5	21.3	144.9	20.7	333	32.4				187
Calcio Total					45.5	20.9	70.5	21.5	144.6	20.5	331	33.1				217
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	<0.01	<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	0.98	1.3	0.06	5.19	0.56				0.10
Plomo Disuelto					<0.0001	<0.0001	0.0003	<0.0001	<0.0001	<0.0001	0.0001	<0.0001				0.0002
Plomo Total		0.015		0.4	0.0025	<0.0001	0.0191	0.0007	0.00088	<0.0001	0.0038	0.001				0.0051
Litio Disuelto					<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	<0.008				0.044
Litio Total					<0.02	<0.02	<0.02	<0.008	0.02	<0.02	0.02	<0.008				0.044
Magnesio Disuelto					3.9	2.6	5.3	3.3	15.9	3.2	37.3	4.3				13.7
Magnesio Total					4.2	2.8	5.2	3.4	15.1	3.6	32.2	4.5				15.7
Manganeso Disuelto					0.0051	<0.005	0.02	<0.005	0.0195	<0.005	0.07	0.016				0.13
Manganeso Total		0.4			0.1041	<0.005	0.721	0.071	0.0602	0.007	0.174	0.045				0.171
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	SW1-E				SW2-E				SW2A-E				
					Quebrada Escobal-aguas arriba				Quebrada Escobal-en medio del Proyecto				Quebrada Escobal- salida del Proyecto				
					Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					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				<0.02	
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	4.6	6.1	4.9	7.6	4.5				7.1	
Potasio Total					5.3	3.5	13	4.8	6.3	5.2	7.4	4.7				7.6	
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	<0.0001				0.0006	
Selenio Total		0.17			0.0001	<0.0001	0.0003	0.0001	0.00011	<0.0001	0.0002	0.0001				0.0007	
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				0.00011	
Sodio Disuelto					9.81	8.3	11.6	8.8	40.1	9.4	87.8	10.2				37.1	
Sodio Total					9.46	7.8	11.8	8.9	39.8	9.4	85.2	10.4				42.3	
Estroncio Disuelto					0.17	0.09	0.26	0.119	1.23	0.1	2.99	0.173				2.09	
Estroncio Total					0.18	0.1	0.25	0.118	1.23	0.11	2.91	0.174				2.42	
Talio Disuelto					<0.0001	<0.0001	0.0002	<0.0001	0.0001	<0.0001	0.0001	<0.0001				0.0001	
Talio Total		0.002			<0.0001	<0.0001	0.0004	<0.0001	0.0001	<0.0001	0.0002	<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	<0.005	<0.005	<0.005	0.007	<0.005				<0.005	
Titanio Total					0.092	<0.005	0.591	0.064	0.2715	<0.005	0.171	0.026				<0.005	
Uranio Disuelto					0.00013	<0.0001	0.0003	<0.0001	0.00028	<0.0001	0.0006	<0.0001		NR	NR	NR	0.0003
Uranio Total					0.00038	<0.0001	0.0011	<0.0001	0.00024	<0.0001	0.0005	<0.0001				0.0003	
Vanadio Disuelto					<0.005	<0.005	0.007	<0.005	0.0065	<0.005	0.015	<0.005				<0.005	
Vanadio Total					0.0059	<0.005	0.024	<0.005	<0.005	<0.005	0.006	<0.005				<0.005	
Zinc Disuelto					0.053	<0.01	0.1	<0.01	0.046	<0.02	0.1	<0.01				<0.01	
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				<2.2	
DQO			125		15.7	<10	40	<10	<2.04	<2.04	<2.04	<10				<10	
Cloruros		250			5	4	7	10.1	<2.04	<2.04	<2.04	10.4				34.3	
Cianuro Total		0.14		1	0.004	<0.003	0.015	<0.003	<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	0.16				0.65	
Nitratos/Nitritos como N					1.61	0.08	4.87	5.26	2.46	0.03	4.9	4.00				1.64	
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	0.2	0.32	<0.1	0.8	0.2				<0.1	
Fosfatos					0.185	0.1	0.3	0.09	0.19	0.1	0.4	0.09				0.06	
Fósforo Disuelto (Orto)					0.06	0.03	0.1	0.04	0.06	0.02	0.13	0.04				<0.02	
Fósforo Total			2	10	0.37	0.04	2.51	0.06	0.08	0.03	0.19	0.05				0.02	
STD (TDS)		500			225	170	280	190	754	170	1620	220				950	
SST (TSS)			50	100	163.6	<5	780	25	67	<5	320	9.0				<5	
ST (TS)					346.3	200	1080	226	850	230	1660	250				984	
Sulfatos		250			26.3	10	42	15.2	472.6	14	1600	36.5				479	
Alcalinidad Total					104	38	161	46.9	80	44	119	64.1				70.3	
Hidrocarburos totales (TPH)					<0.1	<0.09	<0.1	<0.1	<0.1	<0.09	<0.1	<0.1				<0.09	

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, 2017.

Cuadro 5-3: 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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					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	7.87	7.4	6.56	7.94	7.65				7.41
Temperatura (campo)	°C				19.8	17	24	20.4	21	17.2	24	22.0				21.2
Conductividad (campo)	µS/cm				219.7	80	374.5	159.4	308.9	120	612	585.8				664.6
Oxígeno disuelto (campo)					3.8	0.1	6.8	7.62	4.2	0.1	7.5	7.35				7.55
Cr VI	mg/L							<0.05				<0.05				<0.05
DBO								<10				<10				<10
Coliformes Fecales	NMP/100ml							2200				2.40E+04				4.90E+04
Color Real	U Pt/Co				NR	NR	NR	68	NR	NR	NR	25				40
Materia Flotante								Ausente				Ausente				Ausente
Turbidez	NTU							34.4				25.8				21.2
Aluminio Disuelto					0.061	<0.03	0.15	0.12	0.03	<0.03	0.1	0.04				<0.03
Aluminio Total		0.2			3.25	<0.03	17.4	3.79	5.72	0.1	36	3.31				4.10
Antimonio Disuelto					<0.0004	<0.0004	<0.0004	<0.0004	0.0007	0	0.0011	0.0028				0.0018
Antimonio Total		0.006			<0.0004	<0.0004	<0.0004	<0.0004	0.0012	0.0005	0.0037	0.0024				0.0014
Arsénico Disuelto					0.00797	0.0041	0.0139	0.0063	0.00541	0.0039	0.0072	0.0061				0.006
Arsénico Total		0.01		0.1	0.00888	0.006	0.0137	0.0076	0.00873	0.0043	0.0326	0.0076				0.0082
Bario Disuelto					0.0915	0.051	0.118	0.064	0.1645	0.08	0.234	0.097				0.098
Bario Total		1			0.12445455	0.098	0.253	0.099	0.2356	0.144	0.567	0.121				0.129
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	0.02	0.008	<0.01	0.02	0.03				0.02
Boro Total					<0.01	<0.01	0.02	<0.01	0.012	<0.01	0.02	0.03				<0.01
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	17.2	37.4	18.5	61.7	78.4				56.7
Calcio Total					27.9272727	12.3	38.7	17.5	38.3	17.2	58.9	81.8				49.9
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	0.03	<0.01	<0.01	0.01	<0.01				0.04
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	0.05	0.032	<0.02	0.15	<0.02				<0.02
Hierro Total		0.3			1.9	0.06	10.2	1.74	3.8	0.09	26.5	1.59				2.12
Plomo Disuelto					<0.0001	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	0.0002	<0.0001				<0.0001
Plomo Total		0.015		0.4	0.0013	<0.0001	0.0072	0.0014	0.003	<0.0001	0.0198	0.0028				0.0028
Litio Disuelto					<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	0.016				<0.008
Litio Total					<0.02	<0.02	<0.02	<0.008	0.02	<0.02	0.02	0.013				<0.008
Magnesio Disuelto					2.6	1.3	3.5	1.8	4.2	2.4	7.3	6.6				5.4
Magnesio Total					2.7	1.6	3.5	1.8	4.6	2.5	7.3	6.9				4.8
Manganeso Disuelto					0.07418182	0.01	0.381	0.014	0.116	0.011	0.26	0.074				0.074
Manganeso Total		0.4			0.14745455	0.025	0.403	0.088	0.2844	0.101	1.23	0.155				0.148
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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					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	0.015	0.01	<0.01	0.06	<0.008				0.015	
Potasio Disuelto					4.2	3.5	5.5	3.6	5.8	4.2	8.7	5.3				5.0	
Potasio Total					4.5	3.6	7	3.8	6.5	4.4	11.7	5.7				5.2	
Escandio Disuelto					<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
Selenio Disuelto					<0.0001	<0.0001	0.0001	<0.0001	0.00014	<0.0001	0.0005	0.0002				<0.0001	
Selenio Total		0.17			<0.0001	<0.0001	0.0001	<0.0001	0.0002	<0.0001	0.0002	0.0003				0.0001	
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				<0.00005	
Sodio Disuelto					12.65	7.7	16.6	8.4	12.44	9	15.6	19.1				15.7	
Sodio Total					12.17	7.5	15.4	8.3	12.13	8.6	15.2	19.5				14.2	
Estroncio Disuelto					0.19	0.06	0.3	0.113	0.22	0.09	0.36	0.747				0.455	
Estroncio Total					0.18818182	0.08	0.3	0.111	0.228	0.11	0.33	0.779				0.388	
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	<0.005	<0.005	<0.005	<0.005	<0.005				0.006	
Titanio Total					0.071	<0.005	0.307	0.096	0.127	0.005	0.534	0.084				0.102	
Uranio Disuelto					<0.0001	<0.0001	0.0002	<0.0001	0.00012	<0.0001	0.0004	0.0001		NR	NR	NR	0.0001
Uranio Total					0.00019	<0.0001	0.0005	0.0001	0.00027	<0.0001	0.0009	0.0002				0.0002	
Vanadio Disuelto					<0.005	<0.005	0.008	<0.005	<0.005	<0.005	0.011	<0.005				<0.005	
Vanadio Total					0.0051	<0.005	0.019	<0.005	0.0085	<0.005	0.04	<0.005				0.006	
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	0.07	0.065	0.01	0.17	<0.01				0.09	
Grasas y Aceites				10	<2.062	<2.04	<2.326	<2.2	<2.062	<2.02	<2.084	<2.1				<2.2	
DQO				125	10.9	<10	40	14	16.8	<10	60	<10				18	
Cloruros		250			2.7	2	3	4.3	8.5	4	16	15.7				12.2	
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	0.11	0.15	0.1	0.2	0.29				0.19	
Nitratos/Nitritos como N					0.59	<0.02	1.51	1.43	4.49	1.96	10.1	2.36				2.57	
Amonio					0.05	<0.05	0.21	0.18	0.059	<0.05	0.15	<0.05				<0.05	
Nitrógeno Kjeldahl (TKN)					0.35	<0.1	0.6	0.2	0.58	0.1	1.3	0.4				0.3	
Fosfatos					0.12	0.1	0.4	0.09	0.36	0.1	1.2	0.12				0.12	
Fósforo Disuelto (Orto)					0.04	0.02	0.12	0.02	0.12	0.03	0.39	0.04				0.04	
Fósforo Total			2	10	0.05	0.02	0.14	0.07	0.17	0.04	0.39	0.08				0.07	
STD (TDS)		500			183.636364	140	220	166	233.6	150	350	448				328	
SST (TSS)			50	100	48	5	340	33.0	115	<5	880	56.0				54.0	
ST (TS)				231.8	140	500	216	378.2	260	1180	518				380		
Sulfatos	250			16.9	4	25	10.9	27.5	10	57	161				106		
Alcalinidad Total				83	38	118	51.1	80	45	102	68.4				68.3		
Hidrocarburos totales (TPH)				<0.1	<0.09	<0.2	<0.1	<0.1	<0.09	<0.1	<0.1				NA		

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, 2017.

Cuadro 5-3: 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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					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	7.42	7.4	7.1	7.8	7.18	7.5	6.9	8	7.12
Temperatura (campo)	°C				17.4	14.5	21.5	18.0	19.4	12.2	27.3	20.4	18.7	15	21.3	19.7
Conductividad (campo)	µS/cm				72.1	0.1	160.2	51.59	259	60	948	63.21	216	120	416.2	147.9
Oxígeno disuelto (campo)	mg/L				4	0	8	7.64	4	0	8.3	7.76	3.9	0.1	7.5	7.64
Cr VI								<0.05				<0.05				<0.05
DBO								NA				<10				<10
Coliformes Fecales	NMP/100ml				NR	NR	NR	4.90E+02	NR	NR	NR	4.90E+02	NR	NR	NR	4.90E+02
Color Real	U Pt/Co							14				50				63
Materia Flotante								Ausente				Ausente				Ausente
Turbidez	NTU							22.5				28.9				23.7
Aluminio Disuelto	mg/L				0.055	<0.03	0.14	0.06	0.031	<0.03	0.08	<0.03	0.033	<0.03	0.13	<0.03
Aluminio Total		0.2			1.09	<0.03	3.7	2.47	1.89	<0.03	8.1	3.37	3.05	0.1	16.4	3.35
Antimonio Disuelto					<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	0.0013	<0.0004	<0.0004	<0.0004	0.0009	0.0006
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	0.0005	0.0032	0.0007	0.0076	0.0008	0.00382	0.0022	0.0054	0.0023
Arsénico Total		0.01	0.1		0.00177	0.0013	0.0028	0.0014	0.00387	0.0025	0.0074	0.0019	0.00446	0.003	0.0061	0.0032
Bario Disuelto					0.0447	0.023	0.072	0.025	0.0618	0.027	0.136	0.036	0.0946	0.052	0.143	0.072
Bario Total		1			0.0556	0.039	0.069	0.045	0.0806	0.055	0.136	0.066	0.2142	0.088	0.99	0.096
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	0.01
Boro Total					0.01	<0.01	0.02	<0.01	0.379	<0.01	1.93	<0.01	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	<0.0001
Calcio Disuelto					7.9	3.4	13.7	3.4	15.1	5.4	38.9	6.2	23.1	11.2	38.1	14.4
Calcio Total					7.73	3.4	13.1	3.4	14.81	5.9	37.5	6.4	23.04	11.5	36.7	14.2
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	0.04	<0.01	<0.01	0.04
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	0.06	0.097	<0.02	0.28	<0.02	0.022	<0.02	0.07	<0.02
Hierro Total		0.3			0.7	0.16	1.8	0.94	1.3	0.33	4.8	1.75	1.8	0.08	9.5	1.41
Plomo Disuelto					<0.0001	<0.0001	0.0001	0.0002	0.0002	<0.0001	0.0014	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Plomo Total		0.015	0.4		0.0003	<0.0001	0.0012	0.0008	0.0007	<0.0001	0.0028	0.0011	0.0015	<0.0001	0.0083	0.0012
Litio Disuelto					<0.02	<0.02	<0.02	<0.008	<0.008	0.13	<0.02	0.67	<0.008	<0.02	<0.02	<0.008
Litio Total					<0.02	<0.02	<0.02	<0.008	0.133	<0.02	0.68	<0.008	<0.02	<0.02	<0.02	<0.008
Magnesio Disuelto					1.5	0.8	2.5	0.8	3	1.4	7.4	1.6	4.1	2.2	6.4	2.7
Magnesio Total					1.5	0.9	2.5	0.9	3.1	1.8	7.5	1.6	4.3	2.6	6.5	2.8
Manganeso Disuelto					0.025	0.006	0.047	0.011	0.114	<0.005	0.551	0.010	0.032	0.014	0.074	0.010
Manganeso Total		0.4			0.0406	0.014	0.062	0.031	0.1482	0.04	0.543	0.072	0.0981	0.019	0.342	0.044
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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					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	<0.01	<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	0.016	<0.01	<0.01	0.04	0.014
Potasio Disuelto					3	2.5	3.7	1.9	4.1	3.2	7.1	2.8	4.1	3.6	5.4	3.5
Potasio Total					3	2.2	4.1	2.3	4.2	3.1	7.5	3.1	4.5	3.6	7	3.8
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	3.3	32.16	6	135	5.5	11.69	8.7	15.4	8.5
Sodio Total					5.99	3.4	9.4	3.3	31.11	5.3	124	5.4	11.45	8.3	15.5	8.2
Estroncio Disuelto					0.06	0.02	0.09	0.031	0.12	0.03	0.33	0.051	0.17	0.07	0.29	0.104
Estroncio Total					0.057	0.02	0.08	0.034	0.122	0.04	0.35	0.050	0.174	0.09	0.28	0.098
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	<0.005	<0.005	<0.005	0.006	<0.005
Titanio Total					0.027	<0.005	0.094	0.049	0.05	<0.005	0.22	0.092	0.069	<0.005	0.325	0.083
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	<0.0001
Vanadio Disuelto					<0.005	<0.005	0.007	<0.005	<0.005	<0.005	0.01	<0.005	<0.0005	<0.0005	0.008	<0.005
Vanadio Total					<0.005	<0.005	0.009	<0.005	<0.005	<0.005	0.005	0.006	0.0047	<0.0005	0.018	0.006
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	0.07	0.339	<0.01	1.87	0.08
Grasas y Aceites			10	10	<2.062	<2.02	<2.084	<2	<2.062	<2.02	<2.084	<2.2	<2.062	<2.02	<2.084	<2.2
DQO			125		6.5	<10	20	<10	<10	<10	30	<10	10	<10	40	<10
Cloruros		250			1.8	1	3	2.5	43.9	3	230	4.9	3	5	3	5.9
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	0.05	0.11	<0.1	0.3	0.07	<0.1	0.2	0.1	0.10
Nitratos/Nitritos como N					0.13	0.03	0.42	0.55	0.3	<0.02	1.22	1.17	<0.1	3.53	0.19	2.61
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	0.2	<0.1	0.7	0.4	0.2
Fosfatos					0.04	<0.03	0.2	<0.06	0.08	<0.03	0.3	<0.06	0.1	0.2	0.09	0.09
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	0.03
Fósforo Total			2	10	0.02	<0.01	0.05	<0.02	0.04	0.02	0.08	0.04	0.03	0.19	0.19	0.06
STD (TDS)		500			84	60	110	88	187	90	540	108	140	240	100	188
SST (TSS)			50	100	9	<5	32	9.0	21	<5	105	36.0	<5	330	6	26.0
ST (TS)					97	70	130	98	221	120	550	144	150	610	140	200
Sulfatos		250			16.5	<10	47	5.2	14	<10	23	5.5	9	38	19.4	12.1
Alcalinidad Total					25	13	43	11.6	48	22	108	22.8	30	101	54	40.3
Hidrocarburos totales (TPH)					<0.1	<0.09	<0.09	<0.09	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, 2017.

Cuadro 5-3: 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			Sep-17	Línea Base			Sep-17
					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	7.54	7.86	7.5	10.7	7.48
Temperatura (campo)	°C				22.1	18.9	25.1	23.8	21.8	19.1	24.2	22.7
Conductividad (campo)	µS/cm				363.7	186.8	807.6	260.1	267.4	121.8	518	162.2
Oxígeno disuelto (campo)	mg/L				5.14	0.28	7.48	6.97	6.2	0.8	8.5	7.06
Cr VI					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DBO					15	15	25	<10	<10	<10	<10	<10
Coliformes Fecales	NMP/100ml				2x10 <sup>6</sup>	2x10 <sup>4</sup>	5x10 <sup>6</sup>	3.50E+05	9x10 <sup>4</sup>	1x10 <sup>2</sup>	2x10 <sup>5</sup>	1.30E+05
Color Real	U Pt/Co				172	19	351	36	342	29	824	63
Materia Flotante								Ausente				Ausente
Turbidez	NTU				14.15	6.09	22.2	92.2	25.72	4.93	46.5	57.8
Aluminio Disuelto	mg/L				0.033	<0.03	0.06	0.16	0.087	<0.03	0.22	0.12
Aluminio Total		0.2			2.39	0.04	7.35	5.96	2.96	0.4	8.6	5.20
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	0.0009	0.0007	<0.0004	0.0012	<0.0004
Arsénico Disuelto					0.0043	0.0025	0.0064	0.0031	0.004	0.0023	0.0057	0.0022
Arsénico Total		0.01	0.1		0.006	0.0041	0.0096	0.0116	0.0042	0.002	0.006	0.0057
Bario Disuelto					0.107	0.074	0.143	0.102	0.094	0.056	0.135	0.061
Bario Total		1			0.136	0.102	0.185	0.15	0.121	0.09	0.154	0.099
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	0.02
Boro Total					0.023	<0.01	0.06	0.02	0.041	<0.01	0.1	0.03
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	0.0002	<0.0001	<0.0001	0.0002	0.0001
Calcio Disuelto					50.4	17.5	156	27.5	35.7	18.2	78.3	14.0
Calcio Total					52.1	18.6	156	27.6	36.2	18.5	79.7	14.5
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	0.02	<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	0.03	<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	0.13	0.09	<0.02	0.17	0.10
Hierro Total		0.3			1.53	0.05	4.36	3.13	1	0.25	2.2	2.59
Plomo Disuelto				0.0001	<0.0001	0.0003	0.0005	0.0002	<0.0001	0.0005	0.0003	
Plomo Total	0.015	0.4		0.003	<0.0001	0.0089	0.0074	0.0022	0.0002	0.008	0.0035	
Litio Disuelto				<0.02	<0.02	0.04	<0.008	<0.02	<0.02	0.04	<0.008	
Litio Total				<0.02	<0.02	0.04	0.011	<0.02	<0.02	0.04	0.014	
Magnesio Disuelto				6.3	3.2	14.7	4.0	6	3.3	9.7	2.8	
Magnesio Total				6.6	3.3	14.8	4.1	6.2	3.4	10.1	2.9	
Manganeso Disuelto				0.095	0.009	0.118	0.080	0.057	0.023	0.148	0.028	
Manganeso Total	0.4			0.1808	0.047	0.349	0.258	0.115	0.043	0.187	0.161	
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			Sep-17	Línea Base			Sep-17	
					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	0.011	<0.01	<0.01	<0.01	<0.008	
Potasio Disuelto					6.5	5.8	7.4	7.2	6	4.5	8.1	4.6	
Potasio Total					6.8	6.4	7.8	7.9	6.1	4.8	8.5	5.2	
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	0.0001	<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	0.00009	<0.00005	<0.00005	0.00007	<0.00005	
Sodio Disuelto					18.8	12.3	33.7	13.7	17.6	10.7	26.9	9.7	
Sodio Total					18.4	12.9	34.3	13.8	17.4	11	28.5	9.6	
Estroncio Disuelto					0.44	0.16	1.5	0.240	0.29	0.14	0.71	0.112	
Estroncio Total					0.44	0.16	1.48	0.237	0.295	0.14	0.73	0.114	
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	0.010	<0.005	<0.005	0.009	0.007	
Titanio Total					0.069	<0.005	0.195	0.177	0.084	0.015	0.237	0.155	
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	0.0003	0.00022	0.0002	0.0003	0.0002	
Vanadio Disuelto					<0.005	<0.005	0.006	0.006	<0.005	<0.005	0.006	<0.005	
Vanadio Total					<0.005	<0.005	0.01	0.011	0.0054	<0.005	0.012	0.012	
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	0.03	<0.01	<0.01	0.03	0.01	
Grasas y Aceites				10	<2.04	<2.02	<2.062	7.9	<2.02	<2.02	<5	<2.2	
DQO				125	20	<10	40	47	17.8	<10	35	23	
Cloruros				250	10	7	19	11.1	12	6	20	8.3	
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	0.13	0.006	<0.003	0.013	0.10	
Nitratos/Nitritos como N				3.07	2.01	5.23	2.75	1.97	1.14	3.85	1.82		
Amonio				0.24	<0.05	0.58	0.48	0.129	<0.05	0.22	0.07		
Nitrógeno Kjeldahl (TKN)				0.74	<0.1	1.6	2.6	0.57	0.3	0.9	0.7		
Fosfatos				0.55	0.3	1	0.56	0.49	0.22	1.3	0.19		
Fósforo Disuelto (Orto)				0.18	0.08	0.33	0.14	0.18	0.09	0.49	0.05		
Fósforo Total		2	10	0.27	0.12	0.51	0.42	0.25	0.09	0.58	0.14		
STD (TDS)	500			312	160	750	252	255	160	440	184		
SST (TSS)		50	100	34	<5	102	122.0	73	<5	340	66.0		
ST (TS)				362	180	750	344	310	200	450	240		
Sulfatos	250			91	22	360	48.9	60	25	169	18.7		
Alcalinidad Total				79	50	110	53.0	70	45	90	38.2		
Hidrocarburos totales (TPH)				<0.01	<0.01	<0.01	<0.09	70	45	90	<0.09		

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, 2017.

48

### 5.2.3 Agua Subterránea

En el Cuadro 5-4 se presentan los resultados de la calidad del agua subterránea (manantiales) y los resultados de laboratorio se presentan en el Anexo 12.5.2. La temperatura de las estaciones muestreadas se encontró entre 23.0 y 25 °C. La lectura menor de pH se obtuvo en la estación GW-4 (6.30 u.e.) y la mayor en la estación GW-3 (6.81 u.e.). Los Sólidos Suspendidos Totales (**SST**) no fueron registrados durante el trimestre. 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) y los sólidos disueltos totales (**TDS**) están por debajo de las directrices de la USEPA (500mg/L) en todas las estaciones de monitoreo.

El Cadmio, Cianuro, Berilio, Bismuto, Cobre, Cromo, Galio, Cobalto, Litio, Cromo hexavalente, Mercurio, Molibdeno, Níquel, Escandio, Talio, Estaño, Plata, Zinc y Cianuro Total no fueron detectados en ninguna de las estaciones. El Selenio fue detectado en las estaciones GW-1A y GW-3 por debajo de la guía de la USEPA (0.17mg/L). El Antimonio fue detectado únicamente en la estación GW2 (0.0012 mg/L) por debajo de la guía dada por la USEPA (0.01 mg/L). El Plomo se registró en GW-1A 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 5-4: 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			
					Nacimiento Aldea El Volcancito				Nacimiento Aldea El Fucío				Nacimiento – Zona central del Proyecto (frente al portal oeste)				Manantial – Aguas arriba del depósito de colas			
					Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					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	6.81	6.54	6.01	7.16	6.30	6.54	6.21	7.13	6.36	6.13	6.13	6.13	
Temperatura de campo	°C				15.2	14.8	15.6	25	21.4	19	23.7	24.2	19.4	18.5	21	23.0	18.1	18.1	18.1	
Conductividad de campo	µS/cm				229.8	223	236.5	159.1	323.4	111.3	500.5	110.1	315.3	236.7	501.1	433.7	147.3	147.3	147.3	
Oxígeno Disuelto de campo	mg/L				0.1	0.03	0.17	6.17	1.18	0.13	2.35	7.07	0.68	0.03	1.26	3.96	0.14	0.14	0.14	
Turbidez	NTU							20.9				54.1				2.53				
Materia Flotante				Ausente				Ausente				Presente				Ausente				
Color Aparente	u Pt/Co			500	NR	NR	NR	223	NR	NR	NR	341	NR	NR	NR	<1	NR	NR	NR	
Color Real	u Pt/Co							84				42				<1				
Cr (VI)	mg/L			0.1				<0.05				<0.05				<0.05				
Coliformes Fecales	NMP/100mL			<1x10 <sup>4</sup>				1.30E+03				4.90E+02				2.30E+01				
Aluminio Disuelto		0.2			<0.03	<0.03	<0.03	0.21	0.075	<0.03	0.24	0.08	<0.03	<0.03	0.04	0.05	1.42	1.42	1.42	
Antimonio Disuelto		0.01			<0.0004	<0.0004	<0.0004	<0.0004	0.00078	<0.0004	0.0011	0.0012	0.0004	<0.0004	0.001	<0.0004	<0.0004	<0.0004	<0.0004	
Arsénico Disuelto		0.01		0.1	0.001	0.0008	0.0011	0.001	0.0156	0.0043	0.0299	0.0106	0.0059	0.0037	0.0115	0.002	0.0008	0.0008	0.0008	
Bario Disuelto		1			0.025	0.022	0.028	0.03	0.24	0.125	0.451	0.113	0.186	0.12	0.328	0.085	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	<0.01	<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	0.02	<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	4.6	33.5	9.6	65.3	9.6	31.6	25.7	43.4	45.3	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	0.17	0.103	0.03	0.17	0.05	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	0.0004	<0.0001	<0.0001	0.0001	<0.0001	<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	0.010	<0.02	<0.02	<0.02	<0.008	<0.02	<0.02	<0.02	
Magnesio Disuelto					3.1	2.9	3.3	2.6	5.9	1.8	12	2.0	4.9	3.3	8.3	10.1	2.6	2.6	2.6	
Manganeso Disuelto	mg/L	0.05			<0.005	<0.005	<0.005	0.023	0.123	0.02	0.356	0.034	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		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	8.1	2.9	1.3	4.3	1.2	3.8	2.5	5	7.9	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	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<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	17.0	13.5	7.2	22	5.7	11.5	9.3	16.4	17.7	10.3	10.3	10.3	
Estroncio Disuelto					0.03	0.03	0.03	0.044	0.26	0.08	0.56	0.091	0.2	0.12	0.37	0.248	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	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	<0.04	<0.1	<0.1	<0.1	
Titanio Disuelto					<0.005	<0.005	<0.005	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.042	0.042	0.042	
Uranio 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	<0.0002	<0.0002	<0.0002	
Vanadio Disuelto					<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.006	0.006	0.006	
Zinc Disuelto		7.4		10	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	0.1	<0.01	0.94	<0.01	3.47	<0.01	0.1	0.1	0.1	
Cloruros		250			15	14	16	21.4	4	2	7	3.5	5	3	6	10.7	4	4	4	

NA



Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	GW1-A				GW-2				GW-3				GW-4			
					Nacimiento Aldea El Volcancito				Nacimiento Aldea El Fucío				Nacimiento – Zona central del Proyecto (frente al portal oeste)				Manantial – Aguas arriba del depósito de colas			
					Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo	
Cianuro Total	mg/L	0.14		1	0.008	<0.003	0.014	<0.003	0.004	<0.003	0.012	<0.003	0.0046	<0.003	0.014	<0.003	<0.003	<0.003	<0.003	NA
Fluoruros					<0.1	<0.1	<0.1	0.07	<0.1	<0.1	<0.1	0.15	0.15	0.1	0.2	0.20	<0.1	<0.1	<0.1	
Nitratos/Nitritos como N					2.19	1.9	2.48	4	0.74	0.14	1.1	2.76	1.19	0.05	3.16	3.21	0.07	0.07	0.07	
Amonio					<0.05	<0.05	0.07	<0.05	0.059	<0.05	0.16	<0.05	0.065	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	
Nitrógeno Kjeldahl (TKN)					0.7	0.3	1.1	0.8	0.63	0.2	0.9	0.4	0.46	<0.05	1.2	<1	0.3	0.3	0.3	
Fosfatos					0.2	0.1	0.2	0.16	0.4	0.1	0.7	0.19	0.3	0.1	0.5	<0.06	0.09	0.09	0.09	
Fósforo Total			2	10	0.1	0.02	0.17	0.07	0.18	0.09	0.27	0.11	0.1	0.05	0.15	0.02	0.03	0.03	0.03	
STD (TDS)		500			190	190	190	224	223	130	350	162	213	190	260	346	170	170	170	
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	262	237.5	140	380	176	217.5	170	270	374	360	360	360	
Sulfatos		250			12.5	11	14	16.8	43	7	90	7.9	30	16	71	110	7	7	7	
Alcalinidad Total					31	31	31	21.6	0.18	0.09	0.27	30.2	83	71	97	63.1	35	35	35	

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. NA: no analizado. Fuente: MSR, 2017.

Cuadro 5-5: 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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					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	6.64	6.32	6.23	6.41	6.82	6.19	6.04	6.34	6.44	
Temperatura de campo	°C				24.4	23.4	25.1	NA	24.1	23.7	24.5	25.3	23.3	22.2	24.4	26.9	23.4	23	24.6	25.1	
Conductividad de campo	μS/cm				427.5	211.9	1001.3	NA	803.9	741.6	829.1	615.8	916.9	872.1	944.8	547.1	469.7	401.4	494.1	858.4	
Oxígeno Disuelto de campo	mg/L				0.75	0.3	1.21	NA	0.65	0.11	1.44	5.61	0.97	0.48	1.93	5.86	0.82	0.19	1.77	4.16	
Turbidez	NTU							NA				0.66				3.94				1.26	
Materia flotante	Visual			Ausente				NA				Ausente				Ausente				Ausente	
Color Aparente	u Pt/Co			500	NR	NR	NR	NA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	
Color Real																					
Cr (VI)	mg/L			0.1				NA				<0.05				<0.05				<0.05	
Coliformes Fecales	NMP/100mL			<1x10 <sup>4</sup>				NA				<1.8				<1.8				<1.8	
Aluminio Disuelto	mg/L	0.2			0.038	<0.03	0.07	NA	<0.03	<0.03	<0.03	<0.03	<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	NA	<0.0004	<0.0004	<0.0004	0.0006	<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	NA	0.0023	0.0021	0.0027	0.0021	0.0023	0.0021	0.0028	0.0023	0.0013	0.001	0.0016	0.0008	
Bario Disuelto		1			0.03	0.024	0.039	NA	0.036	0.032	0.041	0.043	0.042	0.038	0.047	0.028	0.162	0.157	0.166	0.050	
Berilio Disuelto		0.004			<0.002	<0.002	0.003	NA	<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	NA	<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	NA	0.06	0.05	0.07	0.05	0.078	0.06	0.09	0.04	0.015	<0.01	0.03	0.02	
Cadmio Disuelto		0.003		0.1	<0.0001	<0.0001	<0.0001	NA	<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	NA	80.3	76.4	83.3	82.6	100	93	107	70.2	40.8	39.2	42.2	128	
Cromo Disuelto		0.1		0.1	<0.01	<0.01	<0.01	NA	<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	NA	<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	NA	<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	NA	<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	NA	<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	NA	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	0.0002	0.0002	<0.0001	<0.0001	0.0002	0.0003	
Litio Disuelto					<0.02	<0.02	<0.02	NA	<0.02	<0.02	0.02	0.010	<0.02	<0.02	0.02	0.009	<0.02	<0.02	<0.02	<0.008	
Magnesio Disuelto					3.5	2.4	6.1	NA	10.3	10.1	10.7	10.1	11.3	10.9	11.6	7.8	7.3	6.8	7.6	17.0	
Manganeso Disuelto		0.05			0.108	0.03	0.308	NA	<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	NA	<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	NA	<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	NA	<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	NA	4.2	3.9	4.6	4.1	4.7	4.5	5.2	4.0	6	5.5	6.5	8.0	
Escandio Disuelto					<0.1	<0.1	<0.1	NA	<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	NA	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0003	0.0002	0.0004	0.0003	0.0004	0.0006	
Plata Disuelta					<0.00005	<0.00005	<0.00005	NA	<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	NA	29.5	28.2	30.9	28.5	32.3	30.4	35.8	25.5	16.9	15.6	19.1	28.6	
Estroncio Disuelto					0.18	0.07	0.46	NA	0.74	0.71	0.77	0.794	0.89	0.84	0.98	0.648	0.27	0.26	0.29	0.504	
Talio Disuelto					<0.0001	<0.0001	<0.0001	NA	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW-2				MW-3				MW-4				MW-5				
					Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
Estaño Disuelto	mg/L				<0.1	<0.1	<0.1	NA	<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	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
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	0.0005	0.0005
Vanadio Disuelto					0.0059	<0.005	0.008		0.0055	<0.005	0.009	<0.005	0.006	<0.005	0.009	<0.005	<0.005	<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	0.02	<0.01	<0.01	0.1	0.02	<0.01	<0.01	0.1	<0.01	<0.01
Cloruros		250			12	3	28		16	16	17	18.3	20	19	21	13.9	9	8	9	22.9	22.9
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	<0.003
Fluoruros					0.35	0.2	0.7		0.8	0.8	0.8	0.70	0.8	0.8	0.8	0.80	0.18	0.1	0.2	0.23	0.23
Nitratos/Nitritos como N					2.48	2.04	2.93		2.2	2.08	2.26	2.57	2.13	1.98	2.32	2.50	3.32	3	3.57	6.85	6.85
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)					0.56	<0.1	1.1		<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.3	<1	<0.1	<0.1	0.3	<1	<1
Fosfatos					0.233	0.21	0.27		0.315	0.27	0.37	0.25	0.248	0.24	0.27	0.19	0.203	0.15	0.24	0.09	0.09
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	0.04
STD (TDS)		500			253	190	360		470	460	480	486	553	540	560	412	305	290	320	684	684
SST (TSS)			50	100	345.8	137	584		<5	<5	<5	<5	<5	<5	<5	6.0	<5	<5	<5	5.0	5.0
ST (TS)					597.5	350	810		487.5	450	510	508	555	520	580	456	325	280	350	702	702
Sulfatos		250			28.5	4	97		166	162	169	187	212.5	210	220	144	72.3	64	76	300	300
Alcalinidad Total					64	56	80		84	82	86	83.6	85	83	88	86.3	66	61	68	93.6	93.6

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. NA: no analizado. Fuente: MSR, 2017.



Cuadro 5-5: 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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17
					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	6.41	6.38	6.14	6.98	6.56	6.16	6.07	6.29	6.29	7.15	6.9	7.4	7.04
Temperatura de campo	°C				22.3	21.6	22.8	24.5	22.4	22	23.1	22.3	23.3	23.2	23.4	24.6	27.5	25.9	29	28.6
Conductividad de campo	µS/cm				538.2	342.9	752.6	1141	299.6	285.9	323.8	324.5	426.8	424.6	428.1	813.8	1595	1569	1621	555.7
Oxígeno Disuelto de campo	mg/L				0.69	0.19	1.67	3.79	0.61	0.25	1.19	5.39	0.72	0.16	1.45	3.04	0.38	0.35	0.41	2.39
Turbidez	NTU							1.38				5.69				2.66				4.96
Materia flotante	Visual			Ausente				Ausente				Ausente				Ausente				Ausente
Color Aparente	u Pt/Co			500	NR	NR	NR	1	NR	NR	NR	7	NR	NR	NR	45	NR	NR	NR	629
Color Real		<1																		
Cr (VI)	mg/L			0.1				<0.05				<0.05				<0.05				<0.05
Coliformes Fecales	NMP/100mL			<1x10 <sup>4</sup>				<1.8				23				<1.8				<1.8
Aluminio Disuelto	mg/L	0.2			<0.03	<0.03	0.05	<0.03	0.053	<0.03	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Antimonio Disuelto		0.01			0.00045	<0.0004	0.0012	<0.0004	0.00063	0.0005	0.0008	0.0007	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	0.0022	0.0034	0.0029	0.0041	0.0024	0.0021	0.0019	0.0024	0.0012	0.003	0.0007	0.0052	0.0006
Bario Disuelto		1			0.198	0.134	0.281	0.146	0.156	0.129	0.176	0.402	0.125	0.122	0.129	0.077	0.031	0.028	0.034	0.060
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	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	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	185	16.7	13.9	19.6	28.1	34.6	32.5	36.3	114	185.5	170	201	71.7
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	<0.02	<0.02	<0.02	<0.02	<0.02	5.52	1.53	9.51	6.01
Plomo Disuelto		0.015		0.4	<0.0001	<0.0001	<0.0001	<0.0001	0.00013	<0.0001	0.0002	0.0005	<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	0.013
Magnesio Disuelto					7.5	4.9	10.5	19.4	4.8	4.6	5	9.2	6.4	6.3	6.7	17.9	35.8	34.4	37.2	11.1
Manganeso Disuelto		0.05			<0.005	<0.005	0.006	<0.005	0.0065	<0.005	0.012	0.020	0.019	0.012	0.029	<0.005	0.203	0.149	0.257	0.206
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	8.9	6.2	5.4	6.8	8.1	4.8	4.6	5.1	7.0	4.8	4.6	5	5
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	0.0009	0.0002	0.0001	0.0002	<0.0001	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	33.3	19.1	15.4	27.5	17.0	15.2	15	15.6	26.1	45.1	44.7	45.4	27.7
Estroncio Disuelto				0.26	0.18	0.35	0.955	0.1	0.09	0.11	0.189	0.22	0.21	0.23	0.435	1.64	1.58	1.69	0.538	
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	

Parámetros	Unidades	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW-6				MW-7				MW-8				MW-9				
					Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
Estaño Disuelto	mg/L				<0.1	<0.1	<0.1	<0.04	<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	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Uranio Disuelto					0.00013	0.0001	0.0002	0.0006	<0.0001	<0.0001	0.0001	<0.0001	0.00017	0.0001	0.0002	0.0003	<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	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc Disuelto		7.4		10	0.034	<0.01	0.1	0.04	0.034	<0.01	0.1	0.30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	
Cloruros		250			11	6	17	29.4	11	9	12	13.9	6	6	6	23.4	37	36	37	13.9	
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	0.12	0.13	0.1	0.2	0.13	0.17	0.1	0.2	0.15	2.55	2.5	2.6	0.84	
Nitratos/Nitritos como N					5.08	4.42	6.15	20.1	4.75	4.08	5.24	2.98	2.76	2.63	2.83	5.76	<0.02	<0.02	<0.02	<0.02	
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	<0.05
Nitrógeno Kjeldahl (TKN)					<0.1	<0.1	0.2	<1	0.21	<0.1	0.4	<1	0.09	<0.1	0.2	<1	0.23	<0.1	0.4	<1	
Fosfatos					0.173	0.15	0.21	0.09	0.113	0.09	0.18	<0.06	0.23	0.21	0.24	0.12	<0.03	<0.03	<0.03	<0.06	
Fósforo Total				2	10	0.05	0.04	0.06	0.04	0.04	0.07	0.03	0.07	0.06	0.08	0.05	<0.01	<0.01	0.02	0.04	
STD (TDS)		500				340	260	440	902	233	220	250	258	277	270	290	642	905	890	920	414
SST (TSS)				50	100	<5	<5	<5	<5	19.75	7	45	11.0	9	6	14	8.0	27	25	29	28.0
ST (TS)						345	240	450	954	260	230	280	272	300	290	310	676	940	910	970	450
Sulfatos		250				85.3	33	153	399	19.3	17	23	24.2	54.7	54	55	286	440	440	440	129.0
Alcalinidad Total						65	62	68	105	48	41	60	101	68	66	70	83.2	147	136	157	139

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, 2017.

Cuadro 5-5: 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			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					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	NA	7.45	7.45	7.45	7.39	NA	NA	NA	6.89	NA	NA	NA	6.57	NA	NA	NA	7.54	
Temperatura de campo	°C				30.4	30.4	30.4	NA	27.8	27.8	27.8	29.5	NA	NA	NA	25.7	NA	NA	NA	24.1	NA	NA	NA	26.8	
Conductividad de campo	µS/cm				2.243	2.243	2.243	NA	663.9	663.9	663.9	881.0	NA	NA	NA	595.0	NA	NA	NA	478.0	NA	NA	NA	1363	
Oxígeno Disuelto de campo	mg/L				0.09	0.09	0.09	NA	0.05	0.05	0.05	1.27	NA	NA	NA	5.46	NA	NA	NA	4.79	NA	NA	NA	3.70	
Turbidez	NTU							NA				1.10	NA	NA	NA	2.47	NA	NA	NA	39.0	NA	NA	NA	1.54	
Materia flotante	Visual			Ausente				NA				Ausente	NA	NA	NA	Ausente	NA	NA	NA	Presente	NA	NA	NA	Ausente	
Color Aparente	u Pt/Co			500	NR	NR	NR	NA	NR	NR	NR	<1	NA	NA	NA	9	NA	NA	NA	68	NA	NA	NA	495	
Color Real	u Pt/Co			500	NR	NR	NR	NA	NR	NR	NR	<1	NA	NA	NA	<1	NA	NA	NA	<1	NA	NA	NA	7	
Cr (VI)	mg/L			0.1				NA				<0.05	NA	NA	NA	<0.05	NA	NA	NA	<0.05	NA	NA	NA	<0.05	
Coliformes Fecales	NMP/100mL			<1x10 <sup>4</sup>				NA				<1.8	NA	NA	NA	<1.8	NA	NA	NA	4.90E+02	NA	NA	NA	<1.8	
Aluminio Disuelto	mg/L	0.2			<0.03	<0.03	<0.03	NA	0.06	0.06	0.06	0.05	NA	NA	NA	0.07	NA	NA	NA	0.04	NA	NA	NA	<0.03	
Antimonio Disuelto		0.01			0.001	0.001	0.001	NA	<0.0004	<0.0004	<0.0004	0.0007	NA	NA	NA	<0.0004	NA	NA	NA	<0.0004	NA	NA	NA	<0.0004	
Arsénico Disuelto		0.01		0.1	0.0022	0.0022	0.0022	NA	0.0136	0.0136	0.0136	0.0132	NA	NA	NA	0.0061	NA	NA	NA	0.0003	NA	NA	NA	0.0027	
Bario Disuelto		1			0.033	0.033	0.033	NA	0.125	0.125	0.125	0.078	NA	NA	NA	0.128	NA	NA	NA	0.092	NA	NA	NA	0.033	
Berilio Disuelto		0.004			<0.01	<0.01	<0.01	NA	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	
Bismuto Disuelto					<0.08	<0.08	<0.08	NA	<0.04	<0.04	<0.04	<0.04	NA	NA	NA	<0.04	NA	NA	NA	<0.04	NA	NA	NA	<0.04	
Boro Disuelto					0.18	0.18	0.18	NA	0.07	0.07	0.07	0.12	NA	NA	NA	0.07	NA	NA	NA	0.03	NA	NA	NA	0.08	
Cadmio Disuelto		0.003		0.1	<0.0001	<0.0001	<0.0001	NA	<0.0001	<0.0001	<0.0001	<0.0001	NA	NA	NA	<0.0001	NA	NA	NA	<0.0001	NA	NA	NA	<0.0001	
Calcio Disuelto					271	271	271	NA	47.5	47.5	47.5	99.5	NA	NR	NR	NR	62.8	NA	NR	NR	57.0	NA	NR	NR	189
Cromo Disuelto		0.1		0.1	<0.01	<0.01	<0.01	NA	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	
Cobalto Disuelto					<0.01	<0.01	<0.01	NA	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	
Cobre Disuelto		1.3		3	<0.01	<0.01	<0.01	NA	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	NA	NA	NA	<0.01	
Galio Disuelto					<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	NA	NA	NA	<0.1	NA	NA	NA	<0.1	
Hierro Disuelto		0.3			0.21	0.21	0.21	NA	0.05	0.05	0.05	0.02	NA	NA	NA	<0.02	NA	NA	NA	<0.02	NA	NA	NA	4.58	
Plomo Disuelto		0.015		0.4	0.0001	0.0001	0.0001	NA	<0.0001	<0.0001	<0.0001	<0.0001	NA	NA	NA	<0.0001	NA	NA	NA	0.0005	NA	NA	NA	<0.0001	
Litio Disuelto					0.06	0.06	0.06	NA	0.08	0.08	0.08	0.150	NA	NA	NA	0.080	NA	NA	NA	<0.008	NA	NA	NA	0.079	
Magnesio Disuelto					41.3	41.3	41.3	NA	4.1	4.1	4.1	6.3	NA	NA	NA	5.3	NA	NA	NA	10.9	NA	NA	NA	35.5	
Manganeso Disuelto		0.05			0.044	0.044	0.044	NA	0.03	0.03	0.03	0.030	NA	NA	NA	<0.005	NA	NA	NA	<0.005	NA	NA	NA	0.075	
Mercurio Disuelto		0.002		0.01	<0.0002	<0.0002	<0.0002	NA	<0.0002	<0.0002	<0.0002	<0.0002	NA	NA	NA	<0.0002	NA	NA	NA	<0.0002	NA	NA	NA	<0.0002	
Molibdeno Disuelto					0.01	0.01	0.01	NA	<0.01	<0.01	<0.01	<0.02	NA	NA	NA	<0.02	NA	NA	NA	<0.02	NA	NA	NA	<0.02	
Níquel Disuelto		0.61		2	<0.01	<0.01	<0.01	NA	<0.01	<0.01	<0.01	<0.008	NA	NA	NA	<0.008	NA	NA	NA	<0.008	NA	NA	NA	<0.008	
Potasio Disuelto					5	5	5	NA	2.5	2.5	2.5	2.0	NA	NA	NA	4.1	NA	NA	NA	6.4	NA	NA	NA	4.6	
Escandio Disuelto					<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	<0.1	NA	NA	NA	<0.1	NA	NA	NA	<0.1	
Selenio Disuelto		0.17			0.0006	0.0006	0.0006	NA	<0.0001	<0.0001	<0.0001	0.0005	NA	NA	NA	0.0003	NA	NA	NA	<0.0001	NA	NA	NA	<0.0001	
Plata Disuelta					<0.00005	<0.00005	<0.00005	NA	<0.00005	<0.00005	<0.00005	<0.00005	NA	NA	NA	0.00011	NA	NA	NA	<0.00005	NA	NA	NA	<0.00005	
Sodio Disuelto					77.4	77.4	77.4	NA	55.2	55.2	55.2	84.2	NA	NA	NA	50.0	NA	NA	NA	19.5	NA	NA	NA	47.2	
Estroncio Disuelto					2.23	2.23	2.23	NA	1.33	1.33	1.33	4.51	NA	NA	NA	2.36	NA	NA	NA	0.418	NA	NA	NA	1.87	



Parámetros	Unidad	USEPA Salud Humana	IFC Agua Residual Tratada	Acuerdo 236-2006	MW11				PSA-SR				HW-1				RW-1				PSA-1				
					Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	Línea Base			Sep-17	
					Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		Promedio	Mínimo	Máximo		
Talio Disuelto	mg/L				0.0002	0.0002	0.0002	NA	<0.0001	<0.0001	<0.0001	<0.0001	NR	NR	NR	<0.0001	NR	NR	NR	0.0001	NR	NR	NR	<0.0001	
Estaño Disuelto					<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.04				<0.04				<0.04				<0.04	
Titanio Disuelto					<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005				<0.005				<0.005				<0.005	
Uranio Disuelto					0.0007	0.0007	0.0007		0.0002	0.0002	0.0002	0.0003				0.0002				0.0002				0.0005	
Vanadio Disuelto					<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		0.12	0.12	0.12	0.04				0.03				<0.01				<0.01	
Cloruros		250			68	68	68		32	32	32	4.0				7.3				8.2				44.2	
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	
Fluoruros					2.7	2.7	2.7		0.7	0.7	0.7	0.84				0.45				0.35				2.33	
Nitratos/Nitritos como N					0.19	0.19	0.19		<0.02	<0.02	<0.02	0.06		NR	NR	NR	3.08	NR	NR	NR	6.36	NR	NR	NR	<0.02
Amonio					<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	<1				<50				<0.1				<1	
Fosfatos					0.03	0.03	0.03		0.06	0.06	0.06	<0.06				0.12				0.12				<0.06	
Fósforo Total				2	0.06	0.06	0.06		0.02	0.02	0.02	<0.02				0.04				0.06				0.02	
STD (TDS)		500			1370	1370	1370		320	320	320	604				424				348				902	
SST (TSS)				50	145	145	145		<5	<5	<5	<5				<5				34.0				9.0	
ST (TS)					1000	1000	1000		300	300	300	624				482				400				964	
Sulfatos		250			700	700	700		45	45	45	283				172				112				481	
Alcalinidad Total					133	133	133		186	186	186	170				105				90.7				151	

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. NA= no analizado. Fuente: MSR, 2017.

En el Cuadro 5-5 se presentan los resultados de la calidad del agua subterránea (Pozos de Monitoreo, Producción y Artesanal) correspondientes al mes de Septiembre. Los resultados de laboratorio se presentan en el Anexo 12.5.2. Los valores de pH estuvieron en el rango de 6.29 a 7.54 u.e. y la temperatura en el rango de 22.3 a 29.5 °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, MW8, PSA-SR y PSA-1 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 MW4, MW5, MW7, MW8, MW9, RW-1 y PSA-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, Cobalto, Cobre, Galio, Cromo, Cromo Hexavalente, Mercurio, Molibdeno, Níquel, Escandio, Talio, Estaño, Titanio, Vanadio y Cianuro Total no fueron detectados en ninguno de los pozos monitoreados.

El Antimonio se detectó en los pozos MW3, MW5, MW7, MW8 y PSA-SR, 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 Plomo fue detectado únicamente en los pozos MW3, MW4, MW5, MW-7, MW8, MW9 y RW-1 y las concentraciones registradas se encuentran por debajo de lo establecido por la USEPA (0.015 mg/L) y el acuerdo (0.4 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).

## 6 Sedimentos

### 6.1 Sitios de Monitoreo

En el Cuadro 6-1 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 6-1.

Cuadro 6-1: 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, 2017.





**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-8	804048	1601037
SED-9	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 2014, datos de campo del departamento de Ambiente.

Fecha de Elaboración: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

**Escala 1:30,000**

Metros





## 6.2 Resultados

En el Cuadro 6-2 se presenta los resultados de metales registrados para el mes de Septiembre de 2017. Los resultados del laboratorio se presentan en el Anexo 12.6.

El porcentaje de fósforo total se encuentra en el rango de 0.0081% (SED-2) a 0.0138% (SED-4). No se detectó cianuro en ninguna de las estaciones muestreadas.

El mercurio solo se detectó en las estaciones SED-5 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, Cromo y Plomo registradas están muy por debajo de los valores guía. Todas las estaciones muestreadas registraron concentraciones de Arsénico menor al valor sugerido (50 mg/Kg).





Cuadro 6-2: 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	Sep-17	Sep-17	Sep-17	Sep-17	Sep-17	Sep-17
Arsénico Total	mg/Kg**	50	6.4	17.3	28.3	27.2	13.8	15.5
Cadmio Total	mg/Kg**	50	0.24	2.71	1.89	0.17	0.21	0.24
Cromo Total	mg/Kg**	1500	3.1	4.1	3.4	3.7	6.0	5.3
Plomo Total	mg/Kg**	500	8.43	87.8	90.1	11.4	9.9	10.6
Mercurio Total	mg/Kg**	25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cianuro Total	mg/Kg**		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fósforo Total	%		0.0125	0.00821	0.0127	0.0121	0.0138	0.0129

Parámetro	Unidades	Acuerdo 236-2006	SED-5	SED-6	SED-7	SED-8	SED-9
		Aplicación al suelo	Sep-17	Sep-17	Sep-17	Sep-17	Sep-17
Arsénico Total	mg/Kg**	50	10.3	6.1	11.8	10.7	10.2
Cadmio Total	mg/Kg**	50	0.23	0.16	0.21	0.36	0.31
Cromo Total	mg/Kg**	1500	3.7	4.6	3.3	3.7	3.7
Plomo Total	mg/Kg**	500	12.3	6.12	7.8	13.2	11.7
Mercurio Total	mg/Kg**	25	0.12	<0.05	<0.06	<0.05	<0.05
Cianuro Total	mg/Kg**		<0.2	<0.2	<0.2	<0.2	<0.1
Fósforo Total	%		0.0121	0.0113	0.0118	0.0132	0.021

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, 2017.





## 7 Calidad de Efluentes

### 7.1 Sitios de Monitoreo

En el Cuadro 7-1 se describe la estación de monitoreo del efluente hacia la quebrada El Escobal, del agua proveniente de la planta de tratamiento de aguas residuales de tipo especial del proceso de minado. Su ubicación se presenta en la Figura 7-1.

Cuadro 7-1: 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, 2017.

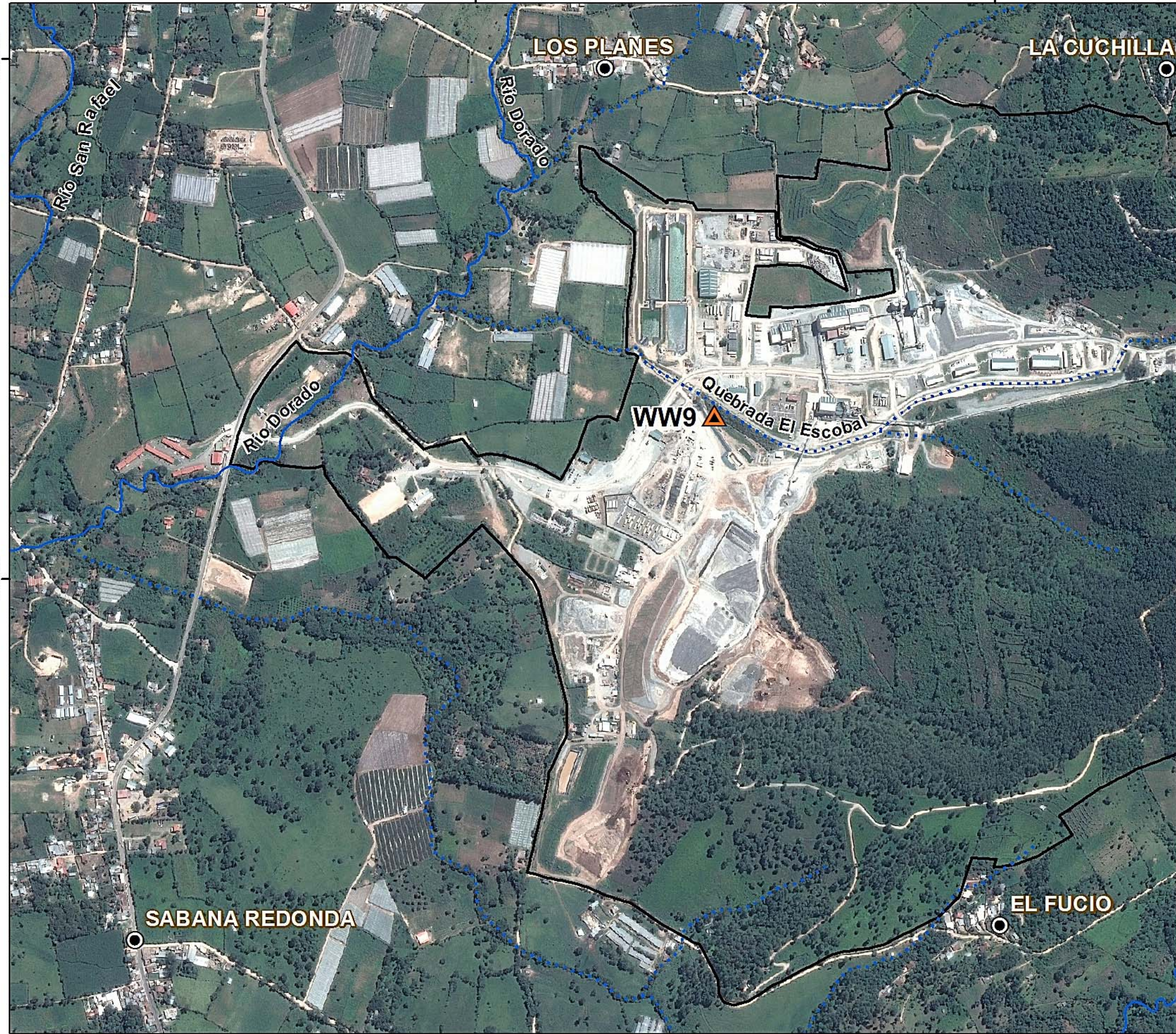




805000 806000

1602000

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**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**

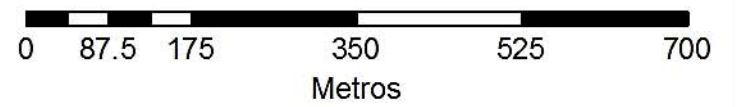
Símbolo	Estación	X	Y
	WW9	805461	1601314

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 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: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:8,000







## 7.2 Resultados

Debido a la suspensión temporal de la licencia de explotación de la empresa, no se reporta descarga de agua proveniente de la planta de tratamiento de aguas residuales de tipo especial del proceso de minado durante el trimestre de Agosto a Octubre de 2017.

## 8 Vibraciones

### 8.1 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 8-1 y en el Cuadro 8-1 se presenta la descripción de cada una de las estaciones.

Cuadro 8-1: 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. Fuente: MSR, 2017.





# 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

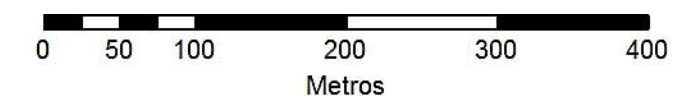
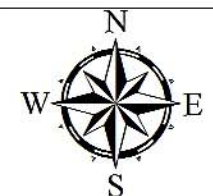
Símbolo	Estación	X	Y
	BS-1	806419	1601819
	BS-2	806361	1601492
	BS-3	805791	1601785

FUENTE: Capas digitales del proyecto ESPREDE/MAGA/IGN del año 2000. Hojas catográficas año 2010 Mataquesuinta (2159-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: Octubre 2017

Distancia Horizontal y Vertical de Grilla: 1,000 metros

Escala 1:5,000







## 8.2 Resultados

Debido a la suspensión temporal de la licencia de explotación de la empresa, no se realizaron voladuras en los frentes de trabajo. Por lo que no se registraron vibraciones asociadas a voladuras en los equipos de medición continua durante el trimestre de Agosto a Octubre de 2017.



## **9 Geoquímica de Roca Estéril**

Debido a la suspensión temporal de la licencia de explotación de la empresa, no se extrajeron muestras de roca de los túneles del proyecto para llevar a cabo el análisis de pH en pasta, durante el trimestre de Agosto a Octubre de 2017.

## 10 Mediciones de Seguridad Industrial y Salud Ocupacional

### 10.1 Presión Sonora

La medición de Presión Sonora en el trimestre de Agosto a Octubre de 2017 se muestra en el Cuadro 10-1. Se hicieron monitoreos mediante el uso de dosímetros portables y posteriormente se realizan comparaciones con la norma OSHA y al Acuerdo Gubernativo 229-2014. Los resultados muestran que se está dentro de parámetros aceptables OSHA en los puntos evaluados, durante las mediciones de Agosto y Septiembre. 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. Sin embargo los datos se encuentran dentro de parámetros aceptables; lo que indica que si con 24 horas de exposición es aceptable, al estar expuesto a un periodo menor se cumple con las normas establecidas.

Debido a la suspensión temporal de la licencia de explotación, no se tiene un flujo normal en la operación y no hay exposición de los colaboradores en las áreas de trabajo, por lo que las mediciones correspondientes al mes de Septiembre no fueron regulares y en Octubre fueron suspendidas.

Cuadro 10-1: Resultados de Presión Sonora de Salud Ocupacional, Proyecto Minero Escobal

Superficie Planta de Procesos	2017		
	Agosto	Septiembre	Octubre
Mes			
Hora Inicio	7:19	6:49	
Duración	07:42 h	11:04 h	
Lmax dBA	105.8	107.5	
Lmin dBA	60.4	60.1	
Prom. Diurno dBA	81.3	71.4	
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	
Leq (Normal sin uso de EPP)	81.3	71.4	
Leq ajustado (Con EPP, homologación 27 dBA a 50% = NRR 13.5 dBA)	67.8	57.9	
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)	Aceptable	Aceptable	

74

Superficie Planta de Procesos		2017		
Mes		Agosto	Septiembre	Octubre
Hora Inicio		7:36	18:51	
Duración		08:03 h	11:03 h	
Lmax dBA		110.5	92.2	
Lmin dBA		60.6	60.3	
Prom. Diurno dBA		79.8	64	
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)		79.8	64	
Leq ajustado (Con EPP, homologación 27 dBA a 50% = NRR 13.5 dBA)		66.3	50.5	
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable	Aceptable	

Interior Mina General		2017		
Mes		Agosto	Septiembre	Octubre
Hora Inicio		6:51		
Duración		11:03 H		
Lmax dBA		118.7		
Lmin dBA		60		
Prom. Diurno dBA		93.1		
Límite Nivel de Sonido Ponderado-A dBA acorde a Acuerdo Gubernativo 229-2014, para 12 horas (12.1 horas y 10.6 horas)*		85		
Leq (Normal sin uso de EPP)		93.1		
Leq ajustado (Con EPP, homologación 29 dBA a 50% = NRR 14.5 dBA)		79.6		
Resultado (Leq ajustado ≤ Límite, entonces es Aceptable)		Aceptable		

NOTA : Operadores utilizan doble protección Auditiva

dBA = decibeles en escala A y respuesta Lenta.

Lmax = lectura más alta durante la medición

Lmin = lectura más baja durante la medición

Leq = promedio ponderado equivalente de datos durante la medición.

Prom. Diurno = promedio logarítmico de Leq registrados de 07:00 a 18:00 horas o turno diurno Mina

Fuente: MSR, 2017.



## 10.2 Mediciones de Partículas Respirables

Los resultados se muestran en el Cuadro 10-2 y corresponden al área de interior mina y planta de proceso. Durante el trimestre puede apreciarse que las mediciones se encuentran dentro de los parámetros aceptables según la norma OSHA. Sin embargo se proporciona equipo de protección respiratoria a todo el personal expuesto, un respirador de media cara usado en las áreas de monitoreo, marca 3M código 7502 y filtro 3M código 60926 P100 homologación NIOSH.

Como se aprecia en los resultados obtenidos el límite permisible para fracción respirable  $PM_4$  y polvo total  $PM_{10}$  se determina que los niveles se encuentran dentro de parámetros establecidos. A pesar de no tener un flujo normal en la operación debido a la suspensión temporal de la licencia de explotación se continuaron realizando las mediciones en las áreas.



Cuadro 10-2: Resultados de Material Particulado de Salud Ocupacional, Proyecto Minero Escobal

Superficie Planta de Proceso - TRITURACION							2017		
Trimestre							XXIII		
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		Agosto	Septiembre	Octubre
Hora Inicio					USEPA <sup>1</sup>	BANCO MUNDIAL <sup>2</sup>			
Duración		OSHA	99.97%				7:00	7:00	7:00
OSHA Fraccion Respirable PM <sub>4</sub>	mg/m <sup>3</sup>	5	16667	150	150	50	0.032	0.057	0.01
OSHA Polvo Total @ PM <sub>10</sub>	mg/m <sup>3</sup>	15	50000	150	150	50	0.032	0.078	0.017

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							2017		
Trimestre							XXIII		
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		Agosto	Septiembre	Octubre
Hora Inicio					USEPA <sup>1</sup>	BANCO MUNDIAL <sup>2</sup>			
Duración		OSHA	99.97%				7:00	7:00	7:00
OSHA Fraccion Respirable PM <sub>4</sub>	mg/m <sup>3</sup>	5	16667	150	150	50	0.015	0.036	0.003
OSHA Polvo Total @ PM <sub>10</sub>	mg/m <sup>3</sup>	15	50000	150	150	50	0.015	0.036	0.003

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							2017		
Trimestre							XXIII		
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		Agosto	Septiembre	Octubre
Hora Inicio					USEPA <sup>1</sup>	BANCO MUNDIAL <sup>2</sup>			
Duración		OSHA	99.97%				7:00	7:00	7:00
OSHA Fraccion Respirable PM <sub>4</sub>	mg/m <sup>3</sup>	5	16667	150	150	50	0.011	0.045	0.003
OSHA Polvo Total @ PM <sub>10</sub>	mg/m <sup>3</sup>	15	50000	150	150	50	0.014	0.059	0.004

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							2017		
Trimestre							XXIII		
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		Agosto	Septiembre	Octubre
Hora Inicio					USEPA <sup>1</sup>	BANCO MUNDIAL <sup>2</sup>	OMS <sup>3</sup>	7:00	7:00
Duración	OSHA		99.97%				11 h	11 h	11 h
OSHA Fraccion Respirable PM <sub>4</sub>	mg/m <sup>3</sup>	5	16667	150	150	50	0.037	0.2	0.036
OSHA Polvo Total @ PM <sub>10</sub>	mg/m <sup>3</sup>	15	50000	150	150	50	0.037	0.273	0.039

**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							2017		
Trimestre							XXIII		
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		Agosto	Septiembre	Octubre
Hora Inicio					USEPA <sup>1</sup>	BANCO MUNDIAL <sup>2</sup>	OMS <sup>3</sup>	7:00	7:00
Duración	OSHA		99.97%				11 h	11 h	11 h
OSHA Fraccion Respirable PM <sub>4</sub>	mg/m <sup>3</sup>	5	16667	150	150	50	0.048	0.165	0.079
OSHA Polvo Total @ PM <sub>10</sub>	mg/m <sup>3</sup>	15	50000	150	150	50	0.048	0.179	0.143

**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, 2017.

### 10.3 Mediciones de Gas

Las mediciones de Gas, se han realizado de forma irregular 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), es la razón por la que se ha mantenido los sistemas de ventilación de manera normal. Como se puede apreciar en el Cuadro 10-3 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, para efectos de publicación de informes, 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.

Debido a la suspensión temporal de la licencia de explotación, no se tiene un flujo normal en la operación y no hay exposición de los colaboradores en las áreas de trabajo, por lo que las mediciones correspondientes al mes de Octubre fueron suspendidas





Cuadro 10-3: Extracto de las mediciones del XV trimestre, acorde a procedimiento de tomar la primera etapa del ciclo que aparezca.

FECHA	Lugar	Maquinaria	Etapa de Ciclo	CO (PPM)	H2S (PPM)	% RH	Temperatura °C	Hora	Turno	Reportado por
				Límite Máximo Turno 25ppm, Exposición Breve 50 ppm	Límite 10ppm, Valores mayores a 1ppm alertar.	Límite variable, alertar si es mayor a 90% y advertir mayor a 95%	Límite variable, alertar si es mayor a 30°C			
24-ago-17	Rampa EC	Ninguna.	Bombeo	0	0	77.2	21.6	09:00	Nocturno	Amarildo Mijángos
	Conexión 1329-OC	Ninguna.	Bombeo	0	0	88.5	24.1	09:14		
	1190-ACC-OC	Ninguna.	Bombeo	0	0	88.4	26.4	09:46		
26-ago-17	1370 Rampa O	Ninguna.	Sin actividad	0	0	78.2	24.7	11:26	Diurno	Ludyn Lima
	1329 Conexión	Ninguna.	Sin actividad	0	0	80.8	23.9	11:19		
	1420 Rama E	Ninguna.	Sin actividad	0	0	58.6	22.1	09:46		
08-sep-17	1215-Monollo.OC	Ninguna.	Bombeo	0	0	70.9	27.6	09:22	Diurno.	José Camillo.
	1190-Sumidero.OC	Ninguna.	Bombeo	0	0	71.4	28.6	09:42		
	1190-Sumidero.EC	Ninguna.	Bombeo	0	0	67.9	30.3	09:55		
	1165-RAMP.EC	Ninguna.	Bombeo	0	0	80	29.8	10:10		
	1215-Sumidero. EC	Ninguna.	Bombeo	0	0	73.6	29.1	10:50		
	1305-RAMP. ascendente. EC	Ninguna.	Bombeo	0	0	90	29.9	11:30		
1305-RAMP. Descendente. EC	Ninguna.	Bombeo	0	0	83.5	26.9	13:00			

Fuente: MSR, 2017.



## 11 Conclusiones

### 11.1 Mediciones del aire en el ambiente

- 1) El material particulado (**PM<sub>10</sub>**), los gases de combustión (**SO<sub>2</sub>** y **NO<sub>2</sub>**) y los niveles de presión sonora (**NPS**) presentaron valores por debajo de las guías establecidos por la USEPA (**PM<sub>10</sub>**, **SO<sub>2</sub>**, **NO<sub>2</sub>** y **NPS**), Banco Mundial (**PM<sub>10</sub>**, **SO<sub>2</sub>**, **NO<sub>2</sub>** y **NPS**), OMS (**SO<sub>2</sub>**, **NO<sub>2</sub>** y **NPS PD**) y British Columbia (**SO<sub>2</sub>** y **NO<sub>2</sub>**).

### 11.2 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) y el establecimiento de la línea base, a excepción de una estación de agua superficial. 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). El plomo se detectó en SW, GW y MW en concentraciones por debajo de lo sugerido por la USEPA.

### 11.3 Mediciones de seguridad industrial y salud ocupacional

- 4) 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 al acuerdo gubernativo 229-2014 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.



## 12 Anexos

### 12.1 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.

Agosto 2017																															
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
<b>LECTURA FLUJÓMETRO (m<sup>3</sup>)</b>																															
Portal Este (tubería 6")	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	NR	NR	NR	NR	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85
Total Este (tubería 8")	132603.2	132649.82	132714.69	132714.69	132714.7	132714.7	132714.7	132871.6	132871.79	132975.03	NR	133211.98	133216.8	133216.8	133501.59	133507.89	133507.89	133507.89	133507.91	133507.91	133507.91	133995.03	133995.2	134068.71	134117.18	134197.29	134197.31	134197.32	134197.34	134728.97	135231.8
Portal Oeste (tubería 6")	NR	895903.52	895903.52	895903.52	895903.52	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Portal Oeste (tubería 8")	NR	0	0	0	0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Clarificador	659726	659726	659726	659726	672808	673256	673256	674495	677110	679956	682745	685226	687960	690684	693420	693737	693737	693737	693737	695095	697796	700427	702770	705718	705892	705892	705892	705892	705892	707715	
<b>VOLUMEN BOMBEADO (m<sup>3</sup>)</b>																															
Portal Este (tubería 6")	150611	0	0	0	0	0	0	0	0	0	-150611	0	0	0	150611	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Este (tubería 8")	132603	47	65	0	0	0	0	157	0	103	-132975	133212	5	0	285	6	0	0	0	0	0	487	0	74	48	80	0	0	0	532	503
Portal Oeste (tubería 6")	0	895904	0	0	0	-895904	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
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	0	0	0	0	13082	448	0	1239	2615	2846	2789	2481	2734	2724	2736	317	0	0	0	1358	2701	2631	2343	2948	174	0	0	0	0	0	1823
<b>CAUDAL PROYECTADO (gpm)</b>																															
Portal Este (tubería 6")	27612	0	0	0	0	0	0	0	0	0	-27612	0	0	0	27612	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Este (tubería 8")	24311	9	12	0	0	0	0	29	0	19	-24379	24422	1	0	52	1	0	0	0	0	0	89	0	13	9	15	0	0	0	97	92
Portal Oeste (tubería 6")	0	164249	0	0	0	-164249	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
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	0	0	0	0	2398	82	0	227	479	522	511	455	501	499	502	58	0	0	0	249	495	482	430	540	32	0	0	0	0	0	334

m<sup>3</sup>: metro cúbico. Gpm: galones por minuto. Anaranjado: No registrado por fallo de flujómetro. Fuente: MSR, 2017.

Septiembre 2017																															
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	
<b>LECTURA FLUJÓMETRO (m<sup>3</sup>)</b>																															
Portal Este (tubería 6")	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	NR	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	
Total Este (tubería 8")	135488.84	135552.98	135619.66	135708.68	135771.31	135877.46	136197.65	136329.53	136408.89	136624.13	136777.84	136985.9	137104.45	137221.43	137415.09	137455.85	137594.02	NR	137884.72	138240.22	138622.15	139046.36	139604.05	139840.72	140122.5	140475.97	140880.69	141042.82	141225.73	141471.33	
Portal Oeste (tubería 6")	NR	NR	NR	NR	NR	NR	NR	895903.52	895903.52	895903.52	895903.52	895903.52	895903.52	895903.52	895903.52	895903.52	895903.58	895903.58	895903.58	895903.58	895903.58	895903.58	895903.58	895903.58	895903.58	895912.24	895912.3	895912.42	895913.27	895914.3	
Portal Oeste (tubería 8")	NR	NR	NR	NR	NR	NR	NR	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	708615	710252	710252	710252	710252	710252	710252	710252	710252	710252	712846	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	713982	714617	714617	
<b>VOLUMEN BOMBEADO (m<sup>3</sup>)</b>																															
Portal Este (tubería 6")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-150611	150611	0	0	0	0	0	0	0	0	0	0	0	0
Total Este (tubería 8")	257	64	67	89	63	106	320	132	79	215	154	208	119	117	194	41	138	-137594	137885	355	382	424	558	237	282	353	405	162	183	246	
Portal Oeste (tubería 6")	0	0	0	0	0	0	0	895904	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	1	1		
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	
Clarificador	900	1637	0	0	0	0	0	0	0	0	2594	1136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	635	0
<b>CAUDAL PROYECTADO (gpm)</b>																															
Portal Este (tubería 6")	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-27612	27612	0	0	0	0	0	0	0	0	0	0	0	0
Total Este (tubería 8")	47	12	12	16	11	19	59	24	15	39	28	38	22	21	36	7	25	-25226	25279	65	70	78	102	43	52	65	74	30	34	45	
Portal Oeste (tubería 6")	0	0	0	0	0	0	0	164249	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0		
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	
Clarificador	165	300	0	0	0	0	0	0	0	0	476	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	116	0

m<sup>3</sup>: metro cúbico. Gpm: galones por minuto. Anaranjado: No registrado por fallo de flujómetro. Fuente: MSR, 2016.

Octubre 2017																																
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	
<b>LECTURA FLUJÓMETRO (m<sup>3</sup>)</b>																																
Portal Este (tubería 6")	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85	150610.85
Total Este (tubería 8")	142152.69	142269.34	142269.34	142269.34	142269.34	142269.34	142269.34	142269.34	142269.34	142400.09	142729.75	142828.08	142937.25	142950.94	142971.76	142989.67	143004.93	143030.93	143056.93	143082.93	143108.92	143134.91	143160.91	143186.9	143212.9	143238.9	143264.88	143290.88	143316.88	143342.88	143368.9	
Portal Oeste (tubería 6")	895914.3	895914.3	895914.3	895914.36	895914.36	895914.36	895920.36	895933.01	895933.01	895933.08	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.14	895933.1	
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	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617	714617		
<b>VOLUMEN BOMBEADO (m<sup>3</sup>)</b>																																
Portal Este (tubería 6")	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	
Total Este (tubería 8")	681	117	0	0	0	0	0	0	0	131	330	98	109	14	21	18	15	26	26	26	26	26	26	26	26	26	26	26	26	26		
Portal Oeste (tubería 6")	0	0	0	0	0	0	6	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
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		
Clarificador	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		
<b>CAUDAL PROYECTADO (gpm)</b>																																
Portal Este (tubería 6")	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		
Total Este (tubería 8")	125	21	0	0	0	0	0	0	0	24	60	18	20	3	4	3	3	5	5	5	5	5	5	5	5	5	5	5	5	5		
Portal Oeste (tubería 6")	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
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		
Clarificador	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		

m<sup>3</sup>: metro cúbico. Gpm: galones por minuto. Celeste: Flujómetro presentó fallos al registrar el volumen acumulado, y éste fue menor al día previo. Fuente: MSR, 2016.

### 12.2 Análisis In Situ y kit de cianuro (CN) en Efluentes

Agosto 2017																																				
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				
<b>Efluente Planta de Tratamiento Agua de Túneles (WW9)</b>																																				
Conductividad	µS/cm	Sin descarga																																		
Kit CN	mg/L																																			
pH	u.e.																																			
Temperatura	°C																																			
Turbidez	NTU																																			
<b>Pileta de Cumplimiento Ambiental (EP-3 o pileta 3)</b>																																				
Conductividad	µS/cm	1603	1590	1564	1689	1676	1774	1793	1834	1755	Sin descarga						1725	1525	1522	Sin descarga			1521	1635	1720	Sin descarga			1659	1558	1509	1489	1729	1511	1650	1854
Kit CN	mg/L	0.000	0.003	0.001	0.004	0.001	0.005	0.002	0.003	0.005	Sin descarga						0.000	0.003	0.002	Sin descarga			0.000	0.009	0.006	Sin descarga			0.008	0.005	0.006	0.003	0.004	0.001	0.000	0.001
pH	u.e.	8.16	8.11	8.27	8.14	7.96	8.08	7.94	7.92	8.02	Sin descarga						8.14	8.22	8.16	Sin descarga			8.07	7.98	7.85	Sin descarga			8.03	8.16	8.19	8.05	8.05	7.99	7.95	8.05
Temperatura	°C	23.4	24.1	25.0	23.2	23.5	23.4	24.6	24.3	24.2	Sin descarga						24.1	24.5	23.9	Sin descarga			26.1	22.9	23.7	Sin descarga			24.6	24.3	24.3	24.7	25.0	24.8	24.0	24.9
Turbidez	NTU	21.2	11.7	17.5	12.9	14.0	16.2	15.5	22.5	14.4	Sin descarga						5.10	13.0	13.2	Sin descarga			9.48	11.8	12.3	Sin descarga			23.8	10.3	15.9	8.61	8.36	8.99	10.5	7.86

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, 2017.



		Septiembre 2017																													
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
		<b>Efluente Planta de Tratamiento Agua de Túneles (WW9)</b>																													
Conductividad	µS/cm	Sin descarga																													
Kit CN	mg/L																														
pH	u.e.																														
Temperatura	°C																														
Turbidez	NTU																														
		<b>Pileta de Cumplimiento Ambiental (EP-3 o pileta 3)</b>																													
Conductividad	µS/cm	1733	1155	1425	1559	Sin descarga	1553	1411	1387	1388	1376	1365	1352	1314	1365	1360	1448	1829	1598	1686	1666	1562	1390	1306	1372	1405	1458	1490	1536	1571	1541
Kit CN	mg/L	0.002	0.005	0.005	0.001		0.001	0.000	0.001	0.011	0.003	0.003	0.001	0.000	0.002	0.002	0.000	0.006	0.002	0.000	0.003	0.009	0.008	0.002	0.000	0.003	0.006	0.000	0.008	0.000	0.000
pH	u.e.	8.09	8.26	8.47	8.28		8.19	8.12	8.11	8.19	8.30	8.17	8.24	8.25	8.07	8.39	8.17	8.27	7.90	7.96	8.26	8.23	8.38	8.23	8.39	8.41	8.42	8.18	8.05	8.19	8.03
Temperatura	°C	24.8	24.2	23.7	23.8		23.2	25.2	23.7	24.7	23.9	25.0	23.9	24.0	25.0	23.6	26.1	25.0	24.2	24.2	24.5	25.4	23.9	24.7	23.9	23.3	24.8	23.2	24.7	24.4	25.9
Turbidez	NTU	12.4	13.5	10.3	8.20		14.0	19.0	7.87	7.38	22.2	16.3	8.90	20.1	16.4	15.4	18.2	16.0	5.49	11.0	9.47	6.33	11.6	14.1	10.7	8.64	11.9	12.7	12.9	14.7	28.9

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.

		Octubre 2017																														
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
		<b>Efluente Planta de Tratamiento Agua de Túneles (WW9)</b>																														
Conductividad	µS/cm	Sin descarga																														
Kit CN	mg/L																															
pH	u.e.																															
Temperatura	°C																															
Turbidez	NTU																															
		<b>Pileta de Cumplimiento Ambiental (EP-3 o pileta 3)</b>																														
Conductividad	µS/cm	1453	1398	1444	1379	1364	1333	1347	2860	1488	1519	1415	1387	1377	1477	1572	1667	1754	2096	1833	1864	1951	2143	1435	1913	1917	1970	1960	1975	1952	1966	1972
Kit CN	mg/L	0.004	0.002	0.011	0.004	0.006	0.000	0.000	0.010	0.005	0.000	0.004	0.005		0.000	0.004	0.003	0.003	0.003	0.004	0.004	0.000	0.001	0.002	0.001	0.003	0.003	0.003	0.005	0.010	0.006	0.006
pH	u.e.	7.88	8.14	8.12	8.21	8.20	8.28	8.19	8.13	8.08	8.04	8.10	8.16	8.53	8.63	8.20	8.08	8.10	7.97	8.20	8.13	7.64	8.12	8.11	8.26	8.30	8.17	8.14	8.14	8.16	8.11	8.30
Temperatura	°C	23.8	25.0	23.8	24.2	22.7	22.5	23.5	24.2	24.4	24.5	23.2	22.1	25.8	23.1	22.4	22.8	23.1	23.1	22.2	23.6	23.1	23.6	23.2	23.0	21.0	19.7	20.5	20.4	22.2	21.1	21.3
Turbidez	NTU	21.3	11.5	36.0	27.8	21.2	19.1	17.0	10.8	17.7	17.6	31.5	17.7	12.0	11.0	9.84	8.83	7.83	10.5	6.65	6.22	8.87	7.57	7.08	8.18	12.1	7.35	6.09	4.98	4.67	2.54	3.91

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.



## **12.3 Resultados crudos de calidad de aire**

### **12.3.1 Material Particulado (PM<sub>10</sub>)**



# BGI PQ200 Air Sampling System

Downloaded August 2017

<b>Job Details:</b>				Job Code: EA-1A																											
Job Name: EA-1A				Site Name: Los Planes (Top Soil Deposit)																											
Version: PQ200				Station Code:																											
Serial No: 1.00				Operators: EvQ																											
Pump Time:				User1: NA																											
Flags: NA				User2: NA																											
<table border="1"><thead><tr><th></th><th>Max</th><th>Min</th><th>Avg</th><th>Units</th></tr></thead><tbody><tr><td>BP</td><td>653</td><td>648</td><td>650</td><td>mmHg</td></tr><tr><td>TA</td><td>28.4</td><td>14.7</td><td>21.2</td><td>°C</td></tr><tr><td>Q</td><td>---</td><td>---</td><td>16.71</td><td>Lpm</td></tr></tbody></table>					Max	Min	Avg	Units	BP	653	648	650	mmHg	TA	28.4	14.7	21.2	°C	Q	---	---	16.71	Lpm	<b>Timer Information:</b>				<b>Mass Concentration Data:</b>			
	Max	Min	Avg	Units																											
BP	653	648	650	mmHg																											
TA	28.4	14.7	21.2	°C																											
Q	---	---	16.71	Lpm																											
QCV				Date				Filter ID: <b>3317-0202</b>																							
Max overheat				Time				Final Wt: 148.760 mg																							
occured NA				dd-mmm				Initial Wt: 148.702 mg																							
				hh:mm:ss				Delta Wt: 0.058 mg																							
				Start: 10-Aug-17				Total Vol: 24.04 m <sup>3</sup>																							
				Stop: 11-Aug-17				Mass Conc: <b>2.41</b> µg/m <sup>3</sup>																							
				ET: 23:59:00																											
Notes 1: Depósito de Suelos, Proyecto El Escobal																															
Notes 2: Minera San Rafael, S.A.																															

# BGI PQ200 Air Sampling System

Downloaded August 2017

<b>Job Details:</b>				Job Code: EA-1B																											
Job Name: EA-1B				Site Name: San Rafael Las Flores																											
Version: PQ200				Station Code:																											
Serial No: 3.00				Operators: EvQ																											
Pump Time:				User1: NA																											
Flags: NA				User2: NA																											
<table border="1"><thead><tr><th></th><th>Max</th><th>Min</th><th>Avg</th><th>Units</th></tr></thead><tbody><tr><td>BP</td><td>653</td><td>648</td><td>651</td><td>mmHg</td></tr><tr><td>TA</td><td>20.0</td><td>16.8</td><td>22.0</td><td>°C</td></tr><tr><td>Q</td><td>---</td><td>---</td><td>16.71</td><td>Lpm</td></tr></tbody></table>					Max	Min	Avg	Units	BP	653	648	651	mmHg	TA	20.0	16.8	22.0	°C	Q	---	---	16.71	Lpm	<b>Timer Information:</b>				<b>Mass Concentration Data:</b>			
	Max	Min	Avg	Units																											
BP	653	648	651	mmHg																											
TA	20.0	16.8	22.0	°C																											
Q	---	---	16.71	Lpm																											
QCV				Date				Filter ID: <b>3322-0707</b>																							
Max overheat				Time				Final Wt: 151.230 mg																							
occured NA				dd-mmm				Initial Wt: 150.630 mg																							
				hh:mm:ss				Delta Wt: 0.600 mg																							
				Start: 22-Aug-17				Total Vol: 24.03 m <sup>3</sup>																							
				Stop: 23-Aug-17				Mass Conc: <b>24.97</b> µg/m <sup>3</sup>																							
				ET: 23:59:00																											
Notes 1: San Rafael Las Flores, Santa Rosa.																															
Notes 2: Minera San Rafael, S.A.																															

# BGI PQ200 Air Sampling System

Downloaded August 2017

<b>Job Details:</b>				Job Code: EA-2A																											
Job Name: EA-2A				Site Name: La Cuchilla.																											
Version: PQ200				Station Code:																											
Serial No: 2.00				Operators: EvQ																											
Pump Time:				User1: NA																											
Flags: NA				User2: NA																											
<table border="1"><thead><tr><th></th><th>Max</th><th>Min</th><th>Avg</th><th>Units</th></tr></thead><tbody><tr><td>BP</td><td>625</td><td>629</td><td>633</td><td>mmHg</td></tr><tr><td>TA</td><td>26.6</td><td>16.2</td><td>19.1</td><td>°C</td></tr><tr><td>Q</td><td>---</td><td>---</td><td>16.70</td><td>Lpm</td></tr></tbody></table>					Max	Min	Avg	Units	BP	625	629	633	mmHg	TA	26.6	16.2	19.1	°C	Q	---	---	16.70	Lpm	<b>Timer Information:</b>				<b>Mass Concentration Data:</b>			
	Max	Min	Avg	Units																											
BP	625	629	633	mmHg																											
TA	26.6	16.2	19.1	°C																											
Q	---	---	16.70	Lpm																											
QCV				Date				Filter ID: <b>3316-0101</b>																							
Max overheat				Time				Final Wt: 147.860 mg																							
occured NA				dd-mmm				Initial Wt: 147.570 mg																							
				hh:mm:ss				Delta Wt: 0.290 mg																							
				Start: 8-Aug-17				Total Vol: 19.71 m <sup>3</sup>																							
				Stop: 9-Aug-17				Mass Conc: <b>14.71</b> µg/m <sup>3</sup>																							
				ET: 19:40:00																											
Notes 1: Aldea La Cuchilla, San Rafael Las Flores, Santa Rosa.																															
Notes 2: Minera San Rafael, S.A.																															

# BGI PQ200 Air Sampling System

Downloaded August 2017

**Job Details:**

Job Name: EA-3  
Version: PQ200  
Serial No: 1.00  
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	627	622	625	mmHg
TA	26.5	16.6	19.7	°C
Q	---	---	16.70	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	8-Aug-17	15:08:00
Stop:	9-Aug-17	15:08:00

**Mass Concentration Data:**

Filter ID:	3311-1212
Final Wt:	144.570 mg
Initial Wt:	144.300 mg
Delta Wt:	0.270 mg
Total Vol:	24.04 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 11.23 µg/m<sup>3</sup>

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

Notes 2: Minera San Rafael, S.A.

# BGI PQ200 Air Sampling System

Downloaded August 2017

**Job Details:**

Job Name: EA-3A  
Version: PQ100  
Serial No: 1.00  
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	647	642	645	mmHg
TA	27.2	16.2	20.2	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	25-Aug-17	14:20:00
Stop:	26-Aug-17	14:20:00

**Mass Concentration Data:**

Filter ID:	3323-0808
Final Wt:	147.800 mg
Initial Wt:	147.510 mg
Delta Wt:	0.290 mg
Total Vol:	24.04 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 12.06 µg/m<sup>3</sup>

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

Notes 2: Minera San Rafael, S.A.

# BGI PQ200 Air Sampling System

Downloaded August 2017

**Job Details:**

Job Name: EA-4A  
Version: PQ200  
Serial No: 3.00  
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	653	649	650	mmHg
TA	30.1	18.0	22.7	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	16-Aug-17	11:35:00
Stop:	17-Aug-17	11:35:00

**Mass Concentration Data:**

Filter ID:	3318-0303
Final Wt:	148.670 mg
Initial Wt:	147.640 mg
Delta Wt:	1.030 mg
Total Vol:	24.03 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 42.86 µg/m<sup>3</sup>

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 August 2017

**Job Details:**

Job Name: EA-5A  
Version: PQ100  
Serial No: 1.00  
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	654	650	652	mmHg
TA	31.7	17.6	23.4	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	16-Aug-17	12:15:00
Stop:	17-Aug-17	12:15:00

**Mass Concentration Data:**

Filter ID:	3326-1111
Final Wt:	150.240 mg
Initial Wt:	149.700 mg
Delta Wt:	0.540 mg
Total Vol:	24.04 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 22.46 µg/m<sup>3</sup>

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

Notes 2: Minera San Rafael, S.A.

# BGI PQ200 Air Sampling System

Downloaded August 2017

**Job Details:**

Job Name: EA-6  
Version: PQ200  
Serial No: 1.00  
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	644	640	643	mmHg
TA	29.5	17.2	20.8	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	22-Aug-17	15:22:00
Stop:	23-Aug-17	15:22:00

**Mass Concentration Data:**

Filter ID:	3321-0606
Final Wt:	149.570 mg
Initial Wt:	148.780 mg
Delta Wt:	0.790 mg
Total Vol:	24.04 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 32.86 µg/m<sup>3</sup>

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 August 2017

**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	653	649	651	mmHg
TA	29.2	15.7	21.0	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	31-Aug-17	11:20:00
Stop:	1-Sep-17	11:20:00

**Mass Concentration Data:**

Filter ID:	3324-0997
Final Wt:	146.330 mg
Initial Wt:	146.090 mg
Delta Wt:	0.240 mg
Total Vol:	24.04 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured NA		

ET: 23:59:00

Mass Conc: 9.98 µg/m<sup>3</sup>

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:** 178-089 (El Escobal)  
**Análisis de muestras:** Septiembre, 11 al 13 de 2017  
**Emisión de reporte:** Septiembre, 13 de 2017

**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<sub>10</sub> in the Atmosphere. **Acreditado ISO 17025**

Cuadro 1: resultados de filtros peso final

No.	Identificación de la muestra	Código de filtro <sup>1</sup>	Peso inicial* (gramos)	Peso final (gramos)	Incertidumbre (gramos)
Límite de detección del método			0.00005		Al 95% confianza K=2
1	EA-1A	3317-0202	0.14872	0.14876	± 0.00005
2	EA-1B	3322-0707	0.15063	0.15123	
3	EA-2A	3316-0101	0.14757	0.14786	
4	EA-3	3311-1212	0.14430	0.14457	
5	EA-3A	3323-0808	0.14751	0.14780	
6	EA-4A	3318-0303	0.14764	0.14867	
7	EA-5A	3326-1111	0.14970	0.15024	
8	EA-6	3321-0606	0.14878	0.14957	
9	EA-7A	3324-0997	0.14609	0.14633	
10	EA-10	3327-1212	0.14760	0.14761	

<sup>1</sup>: Código de filtro asignado por Laboratorio Ambiental, S.A. \*: Corresponde a los pesos iniciales indicado en reportes analíticos RA-17-11731 y RA-17-11741.

**Anexos:**

Anexo 1. Cadena de Custodia R-02-00914

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.

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

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

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
G.C.	Sep., 13/17	J.J. y D.S.	Sep., 14/17	A.G.J.	Sep. 14/17	<b>01</b>







# BGI PQ200 Air Sampling System

Downloaded September 2017

<b>Job Details:</b>				Job Code: EA-1A																											
Job Name: EA-1A				Site Name: Los Planes (Top Soil Deposit)																											
Version: PQ200				Station Code:																											
Serial No: 3				Operators: EvQ																											
Pump Time:				User1: NA																											
Flags: NA				User2: NA																											
<table border="1"><thead><tr><th></th><th>Max</th><th>Min</th><th>Avg</th><th>Units</th></tr></thead><tbody><tr><td>BP</td><td>651</td><td>648</td><td>649</td><td>mmHg</td></tr><tr><td>TA</td><td>28.7</td><td>14.6</td><td>19.8</td><td>°C</td></tr><tr><td>Q</td><td>---</td><td>---</td><td>16.71</td><td>Lpm</td></tr></tbody></table>					Max	Min	Avg	Units	BP	651	648	649	mmHg	TA	28.7	14.6	19.8	°C	Q	---	---	16.71	Lpm	<b>Timer Information:</b>				<b>Mass Concentration Data:</b>			
	Max	Min	Avg	Units																											
BP	651	648	649	mmHg																											
TA	28.7	14.6	19.8	°C																											
Q	---	---	16.71	Lpm																											
QCV				Date				Filter ID: <b>3325-1010</b>																							
Max overheat				dd-mmm				Final Wt: 147.64 mg																							
occured NA				hh:mm:ss				Initial Wt: 147.24 mg																							
				Start: 5-Sep-17 10:25:08				Delta Wt: 0.40 mg																							
				Stop: 6-Sep-17 10:25:04				Total Vol: 24.04 m <sup>3</sup>																							
				ET: 23:59:00				Mass Conc: <b>16.64</b> µg/m <sup>3</sup>																							
Notes 1: Depósito de Suelos, Proyecto El Escobal																															
Notes 2: Minera San Rafael, S.A.																															

# BGI PQ200 Air Sampling System

Downloaded September 2017

<b>Job Details:</b>				Job Code: EA-2A																											
Job Name: EA-2A				Site Name: La Cuchilla.																											
Version: PQ200				Station Code:																											
Serial No: 3				Operators: EvQ																											
Pump Time:				User1: NA																											
Flags: NA				User2: NA																											
<table border="1"><thead><tr><th></th><th>Max</th><th>Min</th><th>Avg</th><th>Units</th></tr></thead><tbody><tr><td>BP</td><td>633</td><td>628</td><td>632</td><td>mmHg</td></tr><tr><td>TA</td><td>26.6</td><td>17.0</td><td>19.7</td><td>°C</td></tr><tr><td>Q</td><td>---</td><td>---</td><td>16.71</td><td>Lpm</td></tr></tbody></table>					Max	Min	Avg	Units	BP	633	628	632	mmHg	TA	26.6	17.0	19.7	°C	Q	---	---	16.71	Lpm	<b>Timer Information:</b>				<b>Mass Concentration Data:</b>			
	Max	Min	Avg	Units																											
BP	633	628	632	mmHg																											
TA	26.6	17.0	19.7	°C																											
Q	---	---	16.71	Lpm																											
QCV				Date				Filter ID: <b>3345-1323</b>																							
Max overheat				dd-mmm				Final Wt: 145.56 mg																							
occured NA				hh:mm:ss				Initial Wt: 145.47 mg																							
				Start: 11-Sep-17 13:50:08				Delta Wt: 0.09 mg																							
				Stop: 12-Sep-17 13:50:05				Total Vol: 24.04 m <sup>3</sup>																							
				ET: 23:59:00				Mass Conc: <b>3.74</b> µg/m <sup>3</sup>																							
Notes 1: Aldea La Cuchilla, San Rafael Las Flores, Santa Rosa.																															
Notes 2: Minera San Rafael, S.A.																															

# BGI PQ200 Air Sampling System

Downloaded September 2017

<b>Job Details:</b>				Job Code: EA-3																											
Job Name: EA-3				Site Name: El Fucío, zona este.																											
Version: PQ200				Station Code:																											
Serial No: 1				Operators: EvQ																											
Pump Time:				User1: NA																											
Flags: NA				User2: NA																											
<table border="1"><thead><tr><th></th><th>Max</th><th>Min</th><th>Avg</th><th>Units</th></tr></thead><tbody><tr><td>BP</td><td>626</td><td>623</td><td>625</td><td>mmHg</td></tr><tr><td>TA</td><td>24.8</td><td>16.2</td><td>18.8</td><td>°C</td></tr><tr><td>Q</td><td>---</td><td>---</td><td>16.71</td><td>Lpm</td></tr></tbody></table>					Max	Min	Avg	Units	BP	626	623	625	mmHg	TA	24.8	16.2	18.8	°C	Q	---	---	16.71	Lpm	<b>Timer Information:</b>				<b>Mass Concentration Data:</b>			
	Max	Min	Avg	Units																											
BP	626	623	625	mmHg																											
TA	24.8	16.2	18.8	°C																											
Q	---	---	16.71	Lpm																											
QCV				Date				Filter ID: <b>3346-1414</b>																							
Max overheat				dd-mmm				Final Wt: 147.61 mg																							
occured NA				hh:mm:ss				Initial Wt: 147.40 mg																							
				Start: 11-Sep-17 11:36:08				Delta Wt: 0.21 mg																							
				Stop: 12-Sep-17 11:36:04				Total Vol: 24.04 m <sup>3</sup>																							
				ET: 23:59:00				Mass Conc: <b>8.73</b> µg/m <sup>3</sup>																							
Notes 1: Aldea El Fucío, San Rafael Las Flores, Santa Rosa.																															
Notes 2: Minera San Rafael, S.A.																															

# BGI PQ200 Air Sampling System

Downloaded September 2017

## Job Details:

Job Name: EA-7A  
Version: PQ200  
Serial No: 1  
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	650	mmHg
TA	29.4	14.7	20.0	°C
Q	---	---	16.71	Lpm

## Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	5-Sep-17	09:55:08
Stop:	6-Sep-17	09:55:05

## Mass Concentration Data:

Filter ID:	3329-1414
Final Wt:	148.40 mg
Initial Wt:	147.95 mg
Delta Wt:	0.45 mg
Total Vol:	24.04 m <sup>3</sup>

QCV NA %

Max overheat NA °C  
occured NA

ET: 23:59:00

Mass Conc: **18.72** µg/m<sup>3</sup>

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:** 178-089 (El Escobal)  
**Análisis de muestras:** Octubre, 03 al 10 de 2017  
**Emisión de reporte:** Octubre, 10 de 2017

**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<sub>10</sub> in the Atmosphere.

Cuadro 1: resultados de filtros peso final

No.	Identificación de la muestra	Código de filtro <sup>1</sup>	Peso inicial* (gramos)	Peso final (gramos)	Incertidumbre (gramos)
Límite de detección del método			0.00005		Al 95% confianza K=2
1	EA-1A	3325-1010	0.14724	0.14764	± 0.00005
2	EA-2A	3345-1323	0.14547	0.14556	
3	EA-3	3346-1414	0.14740	0.14761	
4	EA-7A	3329-1414	0.14795	0.14840	

<sup>1</sup>: Código de filtro asignado por Laboratorio Ambiental, S.A. \*: Corresponde a los pesos iniciales indicado en reportes analíticos RA-17-11741 y RA-17-11754.



**Anexos:**

Anexo 1. Cadena de Custodia R-02-00916

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

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

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
G.C.	Oct., 10/17	J.J. y D.S.	Oct., 10/17	A.G.J.	Oct. 10/17	<b>01</b>



# BGI PQ200 Air Sampling System

Downloaded October 2017

**Job Details:**

Job Name: EA-1A  
Version: PQ200  
Serial No: 3  
Pump Time:  
Flags: NA

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

	Max	Min	Avg	Units
BP	650	647	648	mmHg
TA	23.5	16.2	19.1	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	26-Oct-17	11:06:00
Stop:	27-Oct-17	11:06:00

**Mass Concentration Data:**

Filter ID:	<b>3351-0202</b>
Final Wt:	145.98 mg
Initial Wt:	145.78 mg
Delta Wt:	0.20 mg
Total Vol:	24.04 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured	NA	

ET: 23:59:00

Mass Conc: **8.32** µg/m<sup>3</sup>

Notes 1: Depósito de Suelos, Proyecto El Escobal

Notes 2: Minera San Rafael, S.A.

# BGI PQ200 Air Sampling System

Downloaded October 2017

**Job Details:**

Job Name: EA-2A  
Version: PQ200  
Serial No: 3  
Pump Time:  
Flags: NA

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

	Max	Min	Avg	Units
BP	632	629	630	mmHg
TA	21.0	17.5	18.8	°C
Q	---	---	16.71	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	24-Oct-17	11:55:08
Stop:	25-Oct-17	11:55:04

**Mass Concentration Data:**

Filter ID:	<b>3349-1717</b>
Final Wt:	148.74 mg
Initial Wt:	148.67 mg
Delta Wt:	0.07 mg
Total Vol:	24.041 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured	NA	

ET: 23:59:00

Mass Conc: **2.91** µg/m<sup>3</sup>

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

Notes 2: Minera San Rafael, S.A.

# BGI PQ200 Air Sampling System

Downloaded October 2017

**Job Details:**

Job Name: EA-3  
Version: PQ200  
Serial No: 2  
Pump Time:  
Flags: NA

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

	Max	Min	Avg	Units
BP	626	623	624	mmHg
TA	21.0	16.7	17.9	°C
Q	---	---	16.70	Lpm

**Timer Information:**

	Date	Time
	dd-mmm	hh:mm:ss
Start:	24-Oct-17	14:24:00
Stop:	25-Oct-17	14:24:05

**Mass Concentration Data:**

Filter ID:	<b>3354-0505</b>
Final Wt:	145.53 mg
Initial Wt:	145.49 mg
Delta Wt:	0.04 mg
Total Vol:	24.028 m <sup>3</sup>

QCV	NA	%
Max overheat	NA	°C
occured	NA	

ET: 24:00:00

Mass Conc: **1.66** µg/m<sup>3</sup>

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

Notes 2: Minera San Rafael, S.A.



# BGI PQ200 Air Sampling System

Downloaded October 2017

## Job Details:

Job Name: EA-7A  
Version: PQ200  
Serial No: 2  
Pump Time:  
Flags: NA

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

	Max	Min	Avg	Units
BP	653	650	651	mmHg
TA	27.6	18.6	21.7	°C
Q	---	---	16.71	Lpm

## Timer Information:

	Date	Time
	dd-mmm	hh:mm:ss
Start:	18-Oct-17	14:25:00
Stop:	19-Oct-17	14:25:05
ET:	24:00:00	

## Mass Concentration Data:

Filter ID:	3348-1616
Final Wt:	148.21 mg
Initial Wt:	147.98 mg
Delta Wt:	0.23 mg
Total Vol:	24.037 m <sup>3</sup>

QCV	NA	%
Max overheat occured	NA	°C

Mass Conc: **9.57** µg/m<sup>3</sup>

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:** 178-089 y 178-098 (El Escobal)  
**Análisis de muestras:** Octubre, 30 a noviembre, 02 de 2017  
**Emisión de reporte:** Noviembre, 10 de 2017

**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<sub>10</sub> in the Atmosphere.

Cuadro 1: resultados de filtros peso final

No.	Identificación de la muestra	Código de filtro <sup>1</sup>	Peso inicial* (gramos)	Peso final (gramos)	Incertidumbre (gramos)
Límite de detección del método			0.00005		Al 95% confianza K=2
1	EA-2A	3349-1717	0.14867	0.14874	± 0.00005
2	EA-7A	3348-1616	0.14798	0.14821	
3	EA-1A	3351-0202	0.14578	0.14598	
4	EA-3	3354-0505	0.14549	0.14553	

<sup>1</sup>: Código de filtro asignado por Laboratorio Ambiental, S.A. \*: Corresponde a los pesos iniciales indicado en reportes analíticos RA-17-11765 y RA-17-11766.

**Anexos:**

Anexo 1. Cadena de Custodia R-02-000977

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:
G.C.	Nov., 02/17	J.J. y D.S.	Nov., 07/17	A.G.J.	Nov. 07/17	<b>02</b>



**CADENA DE CUSTODIA**

Laboratorio Ambiental, S.A.

Tronco 1, Sector E, Lote 14 El Encinal, zona 7 de Mixco, Guatemala, Guatemala.

Teléfono: 24318187, Fax 24318108 ext. 102

www.laboratorio-ambiental.com

Información General		Información para el Reporte	
Empresa	MINERA SAN RAFAEL	Reportar a:	LUISA FERNANDA BARRIOS
Contacto	MIGUEL BERRIANZA	Proyecto:	EL ESCOBAL
Dirección	SAN RAFAEL LAS FLORES, STA. ROSA	Formato para reporte <sup>2</sup>	PDF Y EXCEL
Ciudad		Dirección reporte:	LBARRIOS@SANRAFAEL.COM.GT
País	GUATEMALA	Observaciones:	
e-mail	MBERRIANZA@SANRAFAEL.COM.GT		

Plazo de entrega de Reporte (PER) <sup>2</sup>
PER Regular: <input checked="" type="checkbox"/> 6 a 8 días Laborales
PER agilizado: (previa aprobación vía e-mail)
<input type="checkbox"/> 48 a 72 horas
<input type="checkbox"/> 72 a 96 horas
Otro:

Cadena de Custodia No.
R-02- 00977
Pág. 1 de 1

**Instrucciones**

Completar la información solicitada con letra legible.

1. Para uso exclusivo de Laboratorio Ambiental, dejar en blanco

2. Indicar si se requiere en formato de reporte: Word, PDF ó Electrónico

3. Colocar el número de recipientes que correspondan a la descripción del encabezado.

No. Identificación de las Muestra	Identificación laboratorio <sup>1</sup>	Fecha del muestreo	No. Total recipiente	Parámetros a analizar <sup>2</sup>																Observaciones											
				Descripción recipiente <sup>3</sup>			Tipo de Muestra <sup>3</sup>			Preservante <sup>3</sup>	Físico-químico de Agua					Microb	Filtros	Aire	Biología		Varios										
1	EA-1A	3351-0202	20/10/17	1	Vidrio	Porta filtros		Agua																						DEVOLVER FILTRO	
2	EA-2A	3349-1717	24/10/17	1	Plástico																									DEVOLVER FILTRO	
3	EA-3	3354-0505	24/10/17	1	Otros																									DEVOLVER FILTRO	
4	EA-7A	3348-1616	13/10/17	1																										DEVOLVER FILTRO	
5	EA-7A	3347-1515	13/10/17	1																										DEVOLVER FILTRO	
6	EA-8	3352-0303	20/10/17	1																										DEVOLVER FILTRO	
7	EA-10	3353-0404	26/10/17	1																										DEVOLVER FILTRO	
8																															
9																															
10																															
11																															
12																															
13																															
14																															
15																															
Ingreso	Material Entregado por / Firma			LUISA FERNANDA BARRIOS	Fecha	27/10/2017	Hora	Para Uso Exclusivo del laboratorio <sup>1</sup>																							
Ingreso	Material Recibido por / Firma			DIEGO SILVA LINARES	Fecha	30/10/2017	Hora	Estado de las muestras:	Bueno	<input checked="" type="checkbox"/>	Malo	<input type="checkbox"/>	(especificar en observaciones)																		
Ingreso	Material Entregado por / Firma				Fecha		Hora	Temperatura de muestras:							pti:																
Ingreso	Material Recibido por / Firma				Fecha		Hora	Observaciones:	Incluye 170-089 y 170-098 y 170-100																						

### **12.3.2 Informe de Metales en PM<sub>10</sub>**

**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:** 178-090  
**Análisis de muestras:** Septiembre, 27 de 2017  
**Emisión del reporte:** Septiembre, 29 de 2017

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

**Análisis:** Metales en filtros por ICP de Masas.

**Método analítico:** ICP Masas. EPA Total Metals 6010Cmod and Total Metals on Small Filter 6020mod.

Cuadro 01. Resultados de metales en filtros

*Parámetros	LDM (µg)	Estación			
		EA-1B	EA-2A	EA-3A	EA-4A
<b>Código de filtro</b>		<b>3322-0707</b>	<b>3316-0101</b>	<b>3323-0808</b>	<b>3318-0303</b>
<b>Aluminio (Al)</b>	5.0	6.5	<5.0	<5.0	11.9
<b>Antimonio (Sb)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Arsénico (As)</b>	0.60	<0.60	<0.60	<0.60	<0.60
<b>Azufre (S)</b>	2.5	27.5	20.9	20.9	19.6
<b>Bario (Ba)</b>	0.10	0.18	0.12	0.12	0.30
<b>Berilio (Be)</b>	0.10	<0.10	<0.10	<0.10	<0.10
<b>Bismuto (Bi)</b>	0.60	<0.60	<0.60	<0.60	<0.60
<b>Boro (B)</b>	0.60	1.84	1.38	1.38	1.37
<b>Cadmio (Cd)</b>	0.20	<0.20	<0.20	<0.20	<0.20
<b>Calcio (Ca)</b>	5.0	20.4	14.5	14.5	19.0
<b>Cobalto (Co)</b>	0.20	<0.20	<0.20	<0.20	<0.20
<b>Cobre (Cu)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Cromo (Cr)</b>	0.50	1.64	1.65	1.65	1.55
<b>Estaño (Sn)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Estroncio (Sr)</b>	0.10	<0.10	<0.10	<0.10	<0.10
<b>Fósforo (P)</b>	2.5	17.6	16.5	15.5	17.5



*Parámetros	LDM (µg)	Estación			
		EA-1B	EA-2A	EA-3A	EA-4A
<b>Código de filtro</b>		<b>3322-0707</b>	<b>3316-0101</b>	<b>3323-0808</b>	<b>3318-0303</b>
<b>Hierro (Fe)</b>	5.0	6.8	<5.0	<5.0	12.1
<b>Litio (Li)</b>	3.0	<3.0	<3.0	<3.0	<3.0
<b>Magnesio (Mg)</b>	5.0	<5.0	<5.0	<5.0	5.4
<b>Manganeso (Mn)</b>	0.10	0.21	<0.10	0.17	0.47
<b>Molibdeno (Mo)</b>	0.30	<0.30	<0.30	<0.30	<0.30
<b>Níquel (Ni)</b>	0.30	<0.30	<0.30	<0.30	<0.30
<b>Plata (Ag)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Plomo (Pb)</b>	0.30	<0.30	<0.30	<0.30	<0.30
<b>Potasio (K)</b>	10	<10	<10	<10	<10
<b>Selenio (Se)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Silicio (Si)</b>	1.0	159.0	115.0	120.0	125.0
<b>Sodio (Na)</b>	5.0	43.9	39.1	37.4	45.7
<b>Talio (Tl)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Titanio (Ti)</b>	0.10	0.29	0.24	0.16	0.64
<b>Uranio (U)</b>	0.10	<0.10	<0.10	<0.10	<0.10
<b>Vanadio (V)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Zinc (Zn)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Zirconio (Zr)</b>	0.50	<0.50	<0.50	<0.50	<0.50

\*: 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.

*Parámetros	LDM (µg)	Estación			
		EA-5A	EA-6	EA-7A	EA-10
<b>Código de filtro</b>		<b>3326-1111</b>	<b>3321-0606</b>	<b>3324-0997</b>	<b>3327-1212</b>
<b>Aluminio (Al)</b>	5.0	7.3	5.1	<5.0	<5.0
<b>Antimonio (Sb)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Arsénico (As)</b>	0.60	<0.60	<0.60	<0.60	<0.60
<b>Azufre (S)</b>	2.5	19.4	20.8	4.4	32.1
<b>Bario (Ba)</b>	0.10	0.27	0.15	0.12	<0.10
<b>Berilio (Be)</b>	0.10	<0.10	<0.10	<0.10	<0.10
<b>Bismuto (Bi)</b>	0.60	<0.60	<0.60	<0.60	<0.60
<b>Boro (B)</b>	0.60	1.36	1.44	1.57	1.05
<b>Cadmio (Cd)</b>	0.20	<0.20	<0.20	<0.20	<0.20
<b>Calcio (Ca)</b>	5.0	17.1	16.3	15.1	11.4
<b>Cobalto (Co)</b>	0.20	<0.20	<0.20	<0.20	<0.20
<b>Cobre (Cu)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Cromo (Cr)</b>	0.50	1.47	1.47	1.60	1.43
<b>Estaño (Sn)</b>	1.0	<1.0	<1.0	2.3	<1.0
<b>Estroncio (Sr)</b>	0.10	<0.10	<0.10	<0.10	<0.10
<b>Fósforo (P)</b>	2.5	16.1	16.0	16.6	15.7
<b>Hierro (Fe)</b>	5.0	7.3	<5.0	<5.0	<5.0
<b>Litio (Li)</b>	3.0	<3.0	<3.0	<3.0	<3.0
<b>Magnesio (Mg)</b>	5.0	<5.0	<5.0	<5.0	<5.0
<b>Manganeso (Mn)</b>	0.10	0.28	0.14	0.20	<0.10
<b>Molibdeno (Mo)</b>	0.30	<0.30	<0.30	<0.30	<0.30
<b>Níquel (Ni)</b>	0.30	<0.30	<0.30	<0.30	<0.30
<b>Plata (Ag)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Plomo (Pb)</b>	0.30	<0.30	<0.30	<0.30	<0.30
<b>Potasio (K)</b>	10	<10	<10	<10	<10

*Parámetros	LDM (µg)	Estación			
		EA-5A	EA-6	EA-7A	EA-10
<b>Código de filtro</b>		<b>3326-1111</b>	<b>3321-0606</b>	<b>3324-0997</b>	<b>3327-1212</b>
<b>Selenio (Se)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Silicio (Si)</b>	1.0	124.0	165.0	125.0	110.0
<b>Sodio (Na)</b>	5.0	43.5	41.3	38.1	36.0
<b>Talio (Tl)</b>	1.0	<1.0	<1.0	<1.0	<1.0
<b>Titanio (Ti)</b>	0.10	0.39	0.19	0.17	0.15
<b>Uranio (U)</b>	0.10	<0.10	<0.10	<0.10	<0.10
<b>Vanadio (V)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Zinc (Zn)</b>	0.50	<0.50	<0.50	<0.50	<0.50
<b>Zirconio (Zr)</b>	0.50	<0.50	<0.50	<0.50	<0.50

\*: 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-02-000914

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

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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:
G.C.	Sept., 29/17	D.S.	Octubre, 05/17	A.G.J.	Oct., 05/17	<b>01</b>









Your P.O. #: 6669  
 Your Project #: 178-090  
 Site Location: MSR  
 Your C.O.C. #: NA

**Attention: Diego Silva**

CTA Consultoria y Tecnologia Ambiental Mexico, 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: 2017/09/28**  
 Report #: R4741886  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B7K7416**

**Received: 2017/09/21, 14:47**

Sample Matrix: Filter  
 # Samples Received: 8

Analyses	Quantity	Date		Laboratory Method	Reference
		Extracted	Analyzed		
Total Metals (6010Cmod)	8	2017/09/26	2017/09/26	CAM SOP-00408 / BRL SOP-00102	EPA 6010D m
Total Uranium on a Small Filter	8	2017/09/26	2017/09/27	BRL SOP-00103 / BRL SOP-00102	EPA 6020B m

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CMCE, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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.



Your P.O. #: 6669  
 Your Project #: 178-090  
 Site Location: MSR  
 Your C.O.C. #: NA

**Attention: Diego Silva**

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 Av. Insurgentes Sur 1763  
 Piso 5 Col. Guadalupe INN C.P.  
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 Mexico 01020

**Report Date: 2017/09/28**  
 Report #: R4741886  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B7K7416**

**Received: 2017/09/21, 14:47**

Encryption Key

  
Clayton Johnson  
 Project Manager - Air Toxics, Source Evaluation  
 21 Sep 2017 11:21:20

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

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.





Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

**RESULTS OF ANALYSES OF FILTER**

Maxxam ID		FEE225	FEE225	FEE226	FEE227	FEE228	FEE229	FEE230		
Sampling Date		2017/08/22	2017/08/22	2017/08/08	2017/08/25	2017/08/16	2017/08/16	2017/08/22		
COC Number		NA	NA	NA	NA	NA	NA	NA		
	UNITS	3322-0707	3322-0707 Lab-Dup	3316-0101	3323-0808	3318-0303	3326-1111	3321-0606	RDL	QC Batch
<b>Metals</b>										
Total Uranium (U)	ug	ND	ND	ND	ND	ND	ND	ND	0.10	5183036
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate ND = Not detected										

Maxxam ID		FEE231	FEE232		
Sampling Date		2017/08/31	2017/08/10		
COC Number		NA	NA		
	UNITS	3324-0997	3327-1212	RDL	QC Batch
<b>Metals</b>					
Total Uranium (U)	ug	ND	ND	0.10	5183036
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected					



Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

**MISCELLANEOUS (FILTER)**

Maxxam ID		FEE225	FEE226	FEE227	FEE228	FEE229	FEE230	FEE231		
Sampling Date		2017/08/22	2017/08/08	2017/08/25	2017/08/16	2017/08/16	2017/08/22	2017/08/31		
COC Number		NA	NA	NA	NA	NA	NA	NA		
	UNITS	3322-0707	3316-0101	3323-0808	3318-0303	3326-1111	3321-0606	3324-0997	RDL	QC Batch
<b>Metals</b>										
Aluminum (Al)	ug	6.5	ND	ND	11.9	7.3	5.1	ND	5.0	5182135
Antimony (Sb)	ug	ND	ND	ND	ND	ND	ND	ND	1.0	5182135
Arsenic (As)	ug	ND	ND	ND	ND	ND	ND	ND	0.60	5182135
Barium (Ba)	ug	0.18	0.19	0.12	0.30	0.27	0.15	0.12	0.10	5182135
Beryllium (Be)	ug	ND	ND	ND	ND	ND	ND	ND	0.10	5182135
Bismuth (Bi)	ug	ND	ND	ND	ND	ND	ND	ND	0.60	5182135
Boron (B)	ug	1.84	1.50	1.38	1.37	1.36	1.44	1.57	0.60	5182135
Cadmium (Cd)	ug	ND	ND	ND	ND	ND	ND	ND	0.20	5182135
Calcium (Ca)	ug	20.4	14.0	14.5	19.0	17.1	16.3	15.1	5.0	5182135
Chromium (Cr)	ug	1.64	1.57	1.65	1.55	1.47	1.47	1.60	0.50	5182135
Cobalt (Co)	ug	ND	ND	ND	ND	ND	ND	ND	0.20	5182135
Copper (Cu)	ug	ND	ND	ND	ND	ND	ND	ND	0.50	5182135
Iron (Fe)	ug	6.8	ND	ND	12.1	7.3	ND	ND	5.0	5182135
Lead (Pb)	ug	ND	ND	ND	ND	ND	ND	ND	0.30	5182135
Lithium (Li)	ug	ND	ND	ND	ND	ND	ND	ND	3.0	5182135
Magnesium (Mg)	ug	ND	ND	ND	5.4	ND	ND	ND	5.0	5182135
Manganese (Mn)	ug	0.21	ND	0.17	0.47	0.28	0.14	0.20	0.10	5182135
Molybdenum (Mo)	ug	ND	ND	ND	ND	ND	ND	ND	0.30	5182135
Nickel (Ni)	ug	ND	ND	ND	ND	ND	ND	ND	0.30	5182135
Phosphorus (P)	ug	17.6	16.5	15.5	17.5	16.1	16.0	16.6	2.5	5182135
Potassium (K)	ug	ND	ND	ND	ND	ND	ND	ND	10	5182135
Selenium (Se)	ug	ND	ND	ND	ND	ND	ND	ND	1.0	5182135
Silicon (Si)	ug	159	115	120	125	124	165	125	1.0	5182135
Silver (Ag)	ug	ND	ND	ND	ND	ND	ND	ND	0.50	5182135
Sodium (Na)	ug	43.9	39.1	37.4	45.7	43.5	41.3	38.1	5.0	5182135
Strontium (Sr)	ug	ND	ND	ND	ND	ND	ND	ND	0.10	5182135
Sulphur (S)	ug	27.5	28.6	20.9	19.6	19.4	20.8	4.4	2.5	5182135
Thallium (Tl)	ug	ND	ND	ND	ND	ND	ND	ND	1.0	5182135
Tin (Sn)	ug	ND	ND	ND	ND	ND	ND	2.3	1.0	5182135
Titanium (Ti)	ug	0.29	0.24	0.16	0.64	0.39	0.19	0.17	0.10	5182135
Vanadium (V)	ug	ND	ND	ND	ND	ND	ND	ND	0.50	5182135
Zinc (Zn)	ug	ND	ND	ND	ND	ND	ND	ND	0.50	5182135
Zirconium (Zr)	ug	ND	ND	ND	ND	ND	ND	ND	0.50	5182135
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected										



Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

MISCELLANEOUS (FILTER)

Maxxam ID	FEE232			
Sampling Date	2017/08/10			
COC Number	NA			
	UNITS	3327-1212	RDL	QC Batch
<b>Metals</b>				
Aluminum (Al)	ug	ND	5.0	5182135
Antimony (Sb)	ug	ND	1.0	5182135
Arsenic (As)	ug	ND	0.60	5182135
Barium (Ba)	ug	ND	0.10	5182135
Beryllium (Be)	ug	ND	0.10	5182135
Bismuth (Bi)	ug	ND	0.60	5182135
Boron (B)	ug	1.05	0.60	5182135
Cadmium (Cd)	ug	ND	0.20	5182135
Calcium (Ca)	ug	11.4	5.0	5182135
Chromium (Cr)	ug	1.43	0.50	5182135
Cobalt (Co)	ug	ND	0.20	5182135
Copper (Cu)	ug	ND	0.50	5182135
Iron (Fe)	ug	ND	5.0	5182135
Lead (Pb)	ug	ND	0.30	5182135
Lithium (Li)	ug	ND	3.0	5182135
Magnesium (Mg)	ug	ND	5.0	5182135
Manganese (Mn)	ug	ND	0.10	5182135
Molybdenum (Mo)	ug	ND	0.30	5182135
Nickel (Ni)	ug	ND	0.30	5182135
Phosphorus (P)	ug	15.7	2.5	5182135
Potassium (K)	ug	ND	10	5182135
Selenium (Se)	ug	ND	1.0	5182135
Silicon (Si)	ug	110	1.0	5182135
Silver (Ag)	ug	ND	0.50	5182135
Sodium (Na)	ug	36.0	5.0	5182135
Strontium (Sr)	ug	ND	0.10	5182135
Sulphur (S)	ug	32.1	2.5	5182135
Thallium (Tl)	ug	ND	1.0	5182135
Tin (Sn)	ug	ND	1.0	5182135
Titanium (Ti)	ug	0.15	0.10	5182135
Vanadium (V)	ug	ND	0.50	5182135
Zinc (Zn)	ug	ND	0.50	5182135
Zirconium (Zr)	ug	ND	0.50	5182135
RDL = Reportable Detection Limit QC Batch = Quality Control Batch ND = Not detected				



Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

TEST SUMMARY

Maxxam ID: FEE225  
Sample ID: 3322-0707  
Matrix: Filter  
Collected: 2017/08/22  
Shipped: 2017/09/21  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE225 Dup  
Sample ID: 3322-0707  
Matrix: Filter  
Collected: 2017/08/22  
Shipped: 2017/09/21  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE226  
Sample ID: 3316-0101  
Matrix: Filter  
Collected: 2017/08/08  
Shipped: 2017/09/21  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE227  
Sample ID: 3323-0808  
Matrix: Filter  
Collected: 2017/08/25  
Shipped: 2017/09/21  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE228  
Sample ID: 3318-0303  
Matrix: Filter  
Collected: 2017/08/16  
Shipped: 2017/09/21  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE229  
Sample ID: 3326-1111  
Matrix: Filter  
Collected: 2017/08/16  
Shipped: 2017/09/21  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha



Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

**TEST SUMMARY**

Maxxam ID: FEE230  
Sample ID: 3321-0606  
Matrix: Filter

Collected: 2017/08/22  
Shipped:  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE231  
Sample ID: 3324-0997  
Matrix: Filter

Collected: 2017/08/31  
Shipped:  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha

Maxxam ID: FEE232  
Sample ID: 3327-1212  
Matrix: Filter

Collected: 2017/08/10  
Shipped:  
Received: 2017/09/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Metals (6010Cmod)	ICPX	5182135	2017/09/26	2017/09/26	Archana Patel
Total Uranium on a Small Filter	ICP1/MS	5183036	2017/09/26	2017/09/27	Nan Raykha



Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

**GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	23.0°C
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**RESULTS OF ANALYSES OF FILTER**

Total Uranium on a Small Filter : Post digestion duplicate and spike were done on sample FEE225.

**Results relate only to the items tested.**



**QUALITY ASSURANCE REPORT**

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5182135	Aluminum (Al)	2017/09/27			96	85 - 115	ND, RDL=5.0	ug	1.8	20
5182135	Antimony (Sb)	2017/09/27			84 (1)	85 - 115	ND, RDL=1.0	ug	1.4	20
5182135	Arsenic (As)	2017/09/27			98	85 - 115	ND, RDL=0.60	ug	0.20	20
5182135	Barium (Ba)	2017/09/27			100	85 - 115	ND, RDL=0.10	ug	0.20	20
5182135	Beryllium (Be)	2017/09/27			100	85 - 115	ND, RDL=0.10	ug	0.40	20
5182135	Bismuth (Bi)	2017/09/27			98	85 - 115	ND, RDL=0.60	ug	0.61	20
5182135	Boron (B)	2017/09/27			100	85 - 115	ND, RDL=0.60	ug	0.50	20
5182135	Cadmium (Cd)	2017/09/27			102	85 - 115	ND, RDL=0.20	ug	0.20	20
5182135	Calcium (Ca)	2017/09/27			99	85 - 115	ND, RDL=5.0	ug	0.10	20
5182135	Chromium (Cr)	2017/09/27			100	85 - 115	ND, RDL=0.50	ug	0.81	20
5182135	Cobalt (Co)	2017/09/27			99	85 - 115	ND, RDL=0.20	ug	0.20	20
5182135	Copper (Cu)	2017/09/27			98	85 - 115	ND, RDL=0.50	ug	0.61	20
5182135	Iron (Fe)	2017/09/27			99	85 - 115	ND, RDL=5.0	ug	0.61	20
5182135	Lead (Pb)	2017/09/27			99	85 - 115	ND, RDL=0.30	ug	0.81	20
5182135	Lithium (Li)	2017/09/27					ND, RDL=3.0	ug		
5182135	Magnesium (Mg)	2017/09/27			99	85 - 115	ND, RDL=5.0	ug	0.40	20
5182135	Manganese (Mn)	2017/09/27			102	85 - 115	ND, RDL=0.10	ug	0.99	20
5182135	Molybdenum (Mo)	2017/09/27			95	85 - 115	ND, RDL=0.30	ug	0	20
5182135	Nickel (Ni)	2017/09/27			99	85 - 115	ND, RDL=0.30	ug	0.10	20
5182135	Phosphorus (P)	2017/09/27			99	85 - 115	ND, RDL=2.5	ug	0.51	20
5182135	Potassium (K)	2017/09/27			102	85 - 115	ND, RDL=10	ug	0.98	20
5182135	Selenium (Se)	2017/09/27			101	85 - 115	ND, RDL=1.0	ug	0.59	20
5182135	Silicon (Si)	2017/09/27			95	85 - 115	ND, RDL=1.0	ug	1.3	20
5182135	Silver (Ag)	2017/09/27			97	85 - 115	ND, RDL=0.50	ug	0.51	20
5182135	Sodium (Na)	2017/09/27			104	85 - 115	ND, RDL=5.0	ug	0.097	20
5182135	Strontium (Sr)	2017/09/27			99	85 - 115	ND, RDL=0.10	ug	0.20	20
5182135	Sulphur (S)	2017/09/27			101	85 - 115	ND, RDL=2.5	ug	0.50	20
5182135	Thallium (Tl)	2017/09/27			99	85 - 115	ND, RDL=1.0	ug	0	20
5182135	Tin (Sn)	2017/09/27			98	85 - 115	ND, RDL=1.0	ug	0.31	20

**QUALITY ASSURANCE REPORT (CONT'D)**

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
Sampler Initials: MSR

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5182135	Titanium (Ti)	2017/09/27			96	85 - 115	0.10, RDL=0.10 (2)	ug	0.10	20
5182135	Vanadium (V)	2017/09/27			96	85 - 115	ND, RDL=0.50	ug	0.63	20
5182135	Zinc (Zn)	2017/09/27			97	85 - 115	ND, RDL=0.50	ug	0.21	20
5182135	Zirconium (Zr)	2017/09/27			96	85 - 115	ND, RDL=0.50	ug	0.31	20
5183036	Total Uranium (U)	2017/09/27	101	70 - 130	98	85 - 115	ND, RDL=0.10	ug	NC	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spike 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.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Metals Analysis: Analyte was detected in the method blank at a level marginally above the detection limit. Sample results have not been blank corrected. Those results at or near the detection limit may be biased high.

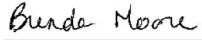


Maxxam Job #: B7K7416  
Report Date: 2017/09/28

CTA Consultoria y Tecnologia Ambiental Mexico, S.A. de C.V.  
Client Project #: 178-090  
Site Location: MSR  
Your P.O. #: 6669  
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).



\_\_\_\_\_  
Brenda Moore, Team Lead



\_\_\_\_\_  
Frank Mo, B.Sc., Inorganic Lab. Manager

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

### **12.3.3 Informe sobre PST y Gases de Combustión**





**MONITOREO DE NO<sub>2</sub>, SO<sub>2</sub> Y PARTÍCULAS  
SEDIMENTABLES TOTALES  
EN LA MINA EL ESCOBAL**

Septiembre – Octubre 2017

San Rafael Las Flores, Santa Rosa, Guatemala

Enero de 2018

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Este resumen presenta los resultados del monitoreo de calidad de aire, realizado para la Mina El Escobal (**la Mina**), por Consultoría y Tecnología Ambiental (**CTA**), en San Rafael Las Flores, Santa Rosa (localización de 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 (**SO<sub>2</sub>** y **NO<sub>2</sub>**); y
- Partículas Sedimentables Totales (**PST**).

Este monitoreo fue realizado con las operaciones de la mina suspendidas, para cumplimiento del plan trimestral. Las estaciones de medición se presentan en el Cuadro 1 y la metodología utilizada en el Cuadro 2.

Cuadro 1: Estaciones de monitoreo de SO<sub>2</sub> y NO<sub>2</sub> y PST

Estación	Ubicación	Coordenadas
EA-1C	Frente a Escuela San Rafael	E (m): 803,887 N (m): 1,601,801
EA-2B	Perímetro de la Mina colindante con la aldea La Cuchilla	E (m): 806,420 N (m): 1,601,814
EA-3B	Aldea El Fucío	E (m): 806,538 N (m): 1,600,367
EA-4A	Aldea Portón de Los Ángeles	E (m): 805,142 N (m): 1,599,903
EA-5A	Aldea Sabana Redonda	E (m): 804,352 N (m): 1,600,404
EA-6	Norte de la Mina, ruta a Mataquescuintla	E (m): 805,168 N (m): 1,603,247
EA-7A	Perímetro de la Mina colindante con aldea Los Planes	E (m): 805,425 N (m): 1,601,523

Coordenadas en metros (**m**). Datum: WGS84 UTM zona 15N. Fuente: CTA, 2017.

Cuadro 2: Metodologías utilizadas para SO<sub>2</sub> y NO<sub>2</sub> y PST

<b>Gases de Combustión</b>	<p><b>SO<sub>2</sub></b>: Análisis espectrofotométrico, descrito en el Título 40, Parte 50, Apéndice A de la USEPA.</p> <p><b>NO<sub>2</sub></b>: Análisis espectrofotométrico. Método de referencia designado por la USEPA: No. EQN-1277-026.</p>
<b>PST</b>	ASTM D 1739-98 (re-aprobación 2004).

Fuente: CTA, 2017.

Los resultados obtenidos para los gases de combustión se compararon con los valores guía reportados en: Corporación Financiera Internacional (**IFC**)<sup>1</sup>, 2007: Guías Generales de ambiente, salud y seguridad, Sección: Emisiones al Aire y Calidad del aire ambiental.

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**)<sup>2</sup> con respecto a las partículas sedimentables totales para industrias mineras, de fundición y relacionadas (BC objetivos de calidad del aire para partículas totales suspendidas y caída de polvo, agosto 12, 2013).

En el Cuadro 3 se presentan los resultados obtenidos de la medición de gases de combustión realizada en septiembre y octubre de 2017; y en el Cuadro 4 se presentan los resultados de la medición de PST para el período de 30 días de 26 septiembre a 28 de octubre de 2017 (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/m<sup>3</sup>

Estaciones de Muestreo	EA-1C	EA-2B	EA-3B	EA-4A	EA-5A	EA-6	EA-7A	Guías del IFC
<b>SO<sub>2</sub></b>	<13	<13	<13	<13	<13	<13	<13	20 µg/m <sup>3</sup>
<b>NO<sub>2</sub></b>	<9	<9	<9	<9	<9	<9	<9	*40µg/m <sup>3</sup>

SO<sub>2</sub>: dióxido de azufre. NO<sub>2</sub>: dióxido de nitrógeno. \*: Promedio anual.<sup>1</sup>: LDM: Límite de detección del método. µg/m<sup>3</sup>: microgramos sobre metros cúbicos.

Fuente: Laboratorio Ambiental, S. A., 2017.

<sup>1</sup>Guías del IFC: [www.ifc.org/ifcext/EnvironmentalGuidelines](http://www.ifc.org/ifcext/EnvironmentalGuidelines)

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



Cuadro 4: Resultados de la medición de PST g/ (m<sup>2</sup> x 30 días)

Parámetros	EA-1C	EA-2B	EA-3B	EA-4A	EA-5A	EA-6	EA-7A	Guías del BC
Sólidos Insolubles	48.899	0.119	2.456	3.328	8.643	0.129	3.143	NA
Sólidos Solubles	2.500	0.301	0.735	3.931	4.847	0.809	3.530	
Sólidos Totales	51.400	0.420	3.192	7.259	13.490	0.938	6.673	
Partículas sedimentables totales mg/(dm <sup>2</sup> *día) <sup>2</sup>	<b>17.133</b>	0.140	1.064	2.420	<b>4.497</b>	0.313	2.224	2.90 <sup>1</sup>

g: gramos. m<sup>2</sup>: metro cuadrado. mg: miligramos. dm<sup>2</sup>: decímetro cuadrado. <sup>1</sup>: valor referido para un período promedio 30 ± 2 días. <sup>2</sup>: Las estaciones fueron muestreadas dentro del período promedio de 30 ± 2 días aprobado por el IFC.

Fuente: Laboratorio Ambiental, S. A., 2017.

### Gases de Combustión

#### **SO<sub>2</sub>:**

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 y el establecido por el IFC (**20 µg/m<sup>3</sup>**).

#### **NO<sub>2</sub>:**

En todas las estaciones de muestreo se obtuvieron resultados menores al límite de detección del método analítico utilizado y al establecido por el IFC (**40 µg/m<sup>3</sup>**).

### 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-1C (17.133 mg/(dm<sup>2</sup> x día)), esto puede atribuirse en gran medida a que esta estación de muestreo se encuentra en el pueblo, en el que se están realizando trabajos de cambio del asfalto y aplanando un terreno al final de la calle, generando cantidades significativas de polvo. La estación EA-5A presenta un valor de 4.497 mg/(dm<sup>2</sup> x día), el cual puede estar influenciado por que en el lugar están haciendo trabajos para ampliar el paqueo aplicando cemento, y a la proximidad a la carretera principal por el paso de vehículos.

Las estaciones que presentaron la menor concentración de PST durante el período de monitoreo, fueron la EA-2B y EA-6 con 0.140 mg/(dm<sup>2</sup> x día) y 0.313 mg/(dm<sup>2</sup> x día) respectivamente, encontrándose una dentro del perímetro de la mina y la otra es una estación de control que se encuentra alejada de la carretera y cuya influencia por tránsito es mínima.

Durante la medición las actividades se encontraban suspendidas dentro de la mina.

Las estaciones EA-3B, EA-4A y EA-7A presentan valores por debajo de la guía del banco 1.064 mg/(dm<sup>2</sup> x día), 2.420 mg/(dm<sup>2</sup> x día) y 2.224 mg/(dm<sup>2</sup> x día) respectivamente.

"Si tiene algún comentario o duda con respecto a la información que aquí se presente, por favor contáctenos"

[servicioalcliente@cta-consultoria.com](mailto:servicioalcliente@cta-consultoria.com)

Trabajo de Campo: J. Juárez	Fecha: Sep., 25-29/17	Redacción de Informe: J. Juárez	Fecha: Noviembre, 21/2017
Revisiones: Ing. D. Silva, MSc. BSc. A. Juárez	Fecha: Nov., 21/2017	Aprobación: <b>Dr. -Ing. Adrián Juárez Director Ejecutivo</b>	Fecha: Nov., 22/2017
			Versión Cliente: <b>02</b>

Correlativo Informe: Resumen 178-092	Aprobación: <b>Inga. Luisa Barrios, Supervisora de Monitoreo Ambiental</b>	Fecha de Aprobación: Enero., 08/2018	Número de Hojas Impresas (Incluye Anexos) <b>23</b>
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## **Anexos**

Anexo 1-1: Reportes analíticos



**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:** 178-092 (CTA)  
**Fecha de muestreo:** Septiembre, 25 al 29 de 2017  
**Fecha de análisis:** Octubre, 23 de 2017  
**Emisión del reporte:** Octubre, 27 de 2017

**Tipo de muestras:** Soluciones absorbentes para análisis de dióxido de azufre (SO<sub>2</sub>) y dióxido de nitrógeno (NO<sub>2</sub>).

**Análisis:** Determinación espectrofotométrica de SO<sub>2</sub> y de NO<sub>2</sub> en la atmósfera.

**Métodos analíticos:**

- SO<sub>2</sub>: 40 CFR, parte 50, Apéndice A-2, EPA. Reference Method for the determination of Sulfur Dioxide in the atmosphere (Pararosaniline Method).
- NO<sub>2</sub>: EPA Designated Equivalent Method No. EQN-1277-026. Sodium Arsenite method for the determination of Nitrogen Dioxide in the atmosphere.

Cuadro 1: Ubicación de estaciones de muestreo

Estación	Ubicación	Coordenadas	Fotografía	Factores ambientales *
EA-1C	Frente a Escuela San Rafael	N: 1,601,801 E: 803,887		Casa dentro del pueblo, caminos pavimentados. Campo de foot ball de tierra frente a la casa.
EA-3B	Aldea El Fucio	N: 1,600,367 E: 806,538		Camino de terracería cercano al terreno, tráfico vehicular moderado.

Estación	Ubicación	Coordenadas	Fotografía	Factores ambientales *
EA-4A	Aldea Portón de Los Ángeles	N: 1,599,903 E: 805,142		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	N: 1,600,404 E: 804,352		El terreno está cerca de la carretera principal (asfaltada), está en campo abierto y cercano a una fábrica de block.
EA-6	Norte de la mina, ruta a Mataquescuintla	N: 1,603,247 E: 805,168		Camino de terracería, poco tráfico vehicular, presencia de ganado vacuno en el terreno.

Coordenadas en metros (m). Datum: NAD27 UTM zona 16 N. Fuente: LAMSA, 2017. \*: Factores ambientales que pueden influir en los resultados.

Cuadro 2: Resultados gases de combustión SO<sub>2</sub> y NO<sub>2</sub>

Parámetro	Unidades	LDM	Identificación de las muestras				
			EA-1C	EA-3B	EA-4A	EA-5A	EA-6
Fecha de muestreo (septiembre, 2017)			25-26	25-26	25-26	26-27	27-28
SO <sub>2</sub>	µg/m <sup>3</sup>	13	< 13	< 13	< 13	< 13	< 13
	ppm	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
NO <sub>2</sub>	µg/m <sup>3</sup>	9	< 9	< 9	< 9	< 9	< 9
	ppm	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

LDM: límite de detección del método, µg/m<sup>3</sup>: microgramos por metro cúbico, ppm: partes por millón.

Cuadro 3: Concentraciones de SO<sub>2</sub> y NO<sub>2</sub> en controles de duplicados

Parámetro	Control con duplicado		
	Unidades	DEA-3B	DEA-5A
SO <sub>2</sub>	µg/m <sup>3</sup>	< 13	NA
	ppm	< 0.005	NA
NO <sub>2</sub>	µg/m <sup>3</sup>	NA	< 9
	ppm	NA	< 0.005

<: menor al límite de detección. µg: microgramo. µg/m<sup>3</sup>: microgramos por metro cúbico. NA: No Aplica. DEA-3B: duplicado de la estación EA-3B. DEA-5A: duplicado de la estación EA-5A.



Cuadro 4: Concentraciones de SO<sub>2</sub> y NO<sub>2</sub> – Controles de laboratorio

Parámetro	Unidades	Incertidumbre	CDL		
		Al 95% confianza, k=2	Unidades	Teórica	Real
SO <sub>2</sub>	µg/m <sup>3</sup>	± 0.60	µg	15.7	15.8
	ppm	± 0.00023			
NO <sub>2</sub>	µg/m <sup>3</sup>	± 2.00	µg/mL	1.00	1.02
	ppm	± 0.00112			

ppm: partes por millón. microgramo. µg/m<sup>3</sup>: microgramo por metro cúbico. µg/mL: microgramo por mililitro. Según los métodos analíticos, la diferencia entre las concentraciones teóricas y reales de los controles no deben ser mayores a 1 µg de SO<sub>2</sub> y a 0.1 µg/mL de NO<sub>2</sub>, respectivamente.

## Anexos:

Anexo 1. Cadena de custodia R-02-000972

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. Ana Gabriela Juárez  
Especialista ambiental, Director de Laboratorio

Redacción:	Fecha:	Revisión:	Fecha:	Aprobación:	Fecha:	Versión cliente:
J.J.	Oct., 25/17	G.C y D.S.	Oct., 27/17	A.G.J.	Oct. 27/17	<b>02</b>



**Cliente:** Minera San Rafael  
**Dirección:** Boulevard Los Próceres, 18 calle 24-69 z. 10, Centro Empresarial Zona Pradera, Oficina 1406 torre IV  
**Proyecto:** 178-092 (CTA)  
**Fecha de muestreo:** Septiembre 26 a Octubre 28, de 2017  
**Lugar de muestreo:** San Rafael las Flores, Santa Rosa, Guatemala  
**Fecha de análisis:** Octubre, 30 a Noviembre, 14 de 2017  
**Emisión del reporte:** Noviembre, 14 de 2017

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

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.

<sup>1</sup> 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	Perímetro de la Mina contiguo a la Aldea la Cuchilla.		Dentro de instalaciones del proyecto, en perímetro con malla protectora, arriba de carretera de acceso a estación meteorológica.
EA-3B	Aldea El Fucío		Camino de terracería cercano al terreno, tráfico vehicular moderado. Se realizan trabajos de introducción de drenajes y construcción.
EA-4A	Aldea Portón 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.

Estación	Ubicación	Fotografía	Factores ambientales
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.
EA-6	Norte de la mina, ruta a Mataquescuintla		Camino de terracería, poco tráfico vehicular, presencia de ganado vacuno en el terreno.
EA-7A	Perímetro de la Mina, 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.

<sup>2</sup>: Factores ambientales que pueden influir en los resultados. El tiempo de muestreo fue de  $30 \pm 2$  días, de acuerdo a método analítico empleado.

Cuadro 2: Resultados Partículas Sedimentables Totales (PST)

No.	Identificación de la muestra	Tasa de sedimentación <sup>1</sup>			
		Material insoluble en agua [g/(m <sup>2</sup> ·30 días)]	Material soluble en agua [g/(m <sup>2</sup> ·30 días)]	Total* para un periodo de 30 días [g/(m <sup>2</sup> ·30 días)].	Total* para un periodo de 1 día [mg/(dm <sup>2</sup> · día)].
	<b>LDM</b>	<b>0.0019</b>	<b>0.017</b>	<b>0.019</b>	<b>0.006</b>
1	EA-1C	48.899	2.500	51.400	17.133
2	EA-2B	0.119	0.301	0.420	0.140
3	EA-3B	2.456	0.735	3.192	1.064
4	EA-4A	3.328	3.931	7.259	2.420
5	EA-5A	8.643	4.847	13.490	4.497
6	EA-6	0.129	0.809	0.938	0.313
7	EA-7A	3.143	3.530	6.673	2.224

LDM: límite de detección del método. g: gramos; mg: miligramos. m<sup>2</sup>: metros cuadrados. dm<sup>2</sup>: decímetro cuadrado. <sup>1</sup>: las fuentes de incertidumbre para el método de análisis han sido establecidos por el laboratorio y se encuentran descritas en su respectivo procedimiento analítico.

## Anexos:

### Anexo 1. Cadena de Custodia R-02-000976

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:
J.J.	Nov., 14/17	G.C./ D.S.	Nov., 21/17	A.G.J.	Nov., 21/17	<b>02</b>



**CADENA DE CUSTODIA**

Laboratorio Ambiental, S.A.  
Tronco 1, Sector E, Lote 14 El Encinal, zona 7 de Mixco, Guatemala, Guatemala.  
Teléfono: 24318187, Fax 24318108 ext. 102  
www.laboratorio-ambiental.com

Información General			Información para el Reporte	
Empresa	Consultora y Tecnología Ambiental S.A.		Reportar a:	Dr. Ing. Adnan Juárez
Contacto	Dr. Ing. Adnan Juárez Yineda		Proyecto:	17B-042
Dirección	Tronco 1, Sector E, Lote 14 El Encinal Zona 7 Mixco Guatemala.		Formato para reporte <sup>2</sup>	PDF
Ciudad	GUATEMALA.	Tel. / Cel.	Dirección reporte:	Ver info general
		2431-3102	Observaciones:	
País	GUATEMALA.			
e-mail	adnan.juarez@cta-consultora.com			

Plazo de entrega de Reporte (PER) <sup>2</sup>
PER Regular:
<input checked="" type="checkbox"/> 6 a 8 días Laborales
PER agilizado: (previa aprobación vía e-mail)
<input type="checkbox"/> 48 a 72 horas
<input type="checkbox"/> 72 a 96 horas
Otro:

Cadena de Custodia No.
R-02- 00976
Pág. 1 de 1

**Instrucciones**

Completar la información solicitada con letra legible.

1. Para uso exclusivo de Laboratorio Ambiental, dejar en blanco

2. Indicar si se requiere en formato de reporte: Word, PDF ó Electrónico

3. Colocar el número de recipientes que correspondan a la descripción del encabezado.

No. Identificación de las Muestra	Identificación laboratorio <sup>1</sup>	Fecha del muestreo	No. Total recipiente	Descripción recipiente <sup>3</sup>		Tipo de Matriz <sup>2</sup>												Preservante <sup>1</sup>																			Parámetros a analizar <sup>2</sup>														Observaciones
				Vidrio	Plástico	Aire	Filtros	Macromicroorganismos	Peces	Fauna y Flora	Otros	Frio	HNO3	H2SO4	HCl	NaOH	Etanol	Otro	Alcalinidad	Dureza Total	DO / DRP	Nitrógeno total	Fósforo Total	Color	Acetatos & Grasas / TPH	Metales / Cianuro/Hg	Sólidos totales	Sólidos Suspendedos Totales	Sólidos Disueltos Totales	Carbonos orgánicos	Carbonos fósiles	E-Coli	Peso Inicial	Peso final	S, C, Mg o Metales	PH <sub>1c</sub>	NO <sub>2</sub> y SO <sub>2</sub>	Id. Tax. Macroinvertebrados	Id. Tax. Peces	Id. Tax. Herpetofauna	Ecotoxicidad	Descarga/Análisis de datos	Otro								
1	EA-1C	2109-17-10	26-27/10/17	1																																					X	TSP									
2	EA-2B	2110-17-10	27-28/10/17	1																																					X	TSP									
3	EA-3B	2111-17-10	26-27/10/17	1																																					X	TSP									
4	EA-4A	2112-17-10	26-27/10/17	1																																					X	TSP									
5	EA-5A	2113-17-10	26-27/10/17	1																																					X	TSP									
6	EA-6	2114-17-10	27-27/10/17	1																																					X	TSP									
7	EA-7A	2115-17-10	26-27/10/17	1																																					X	TSP.									
8	EA-2B	2116-17-10	28-29/10/17	2																																							X	Muestreo realizado de acuerdo a IT-045							
9	EA-7A	2117-17-10	27-28/10/17	2																																								X	Favor generar reporte analítico por separado para análisis de NO <sub>2</sub> y SO <sub>2</sub> .						
10																																																			
11																																																			
12																																																			
13																																																			
14																																																			
15																																																			
Ingreso	Material Entregado por / Firma		Loreal Uayres		Fecha	30/10/17	Hora	7:15	Para Uso Exclusivo del laboratorio <sup>3</sup>														Estado de las muestras:			Bueno <input checked="" type="checkbox"/>	Malo <input type="checkbox"/>	(especificar en observaciones)																							
	Material Recibido por / Firma		GABRIEL UYINAE		Fecha	30/10/17	Hora	7:15															Temperatura de muestras:			TAMBIENTE			pH:	N.A.																					
Egreso	Material Entregado por / Firma				Fecha		Hora																Observaciones:																												

### **12.3.4 Presión Sonora**

# ER-1

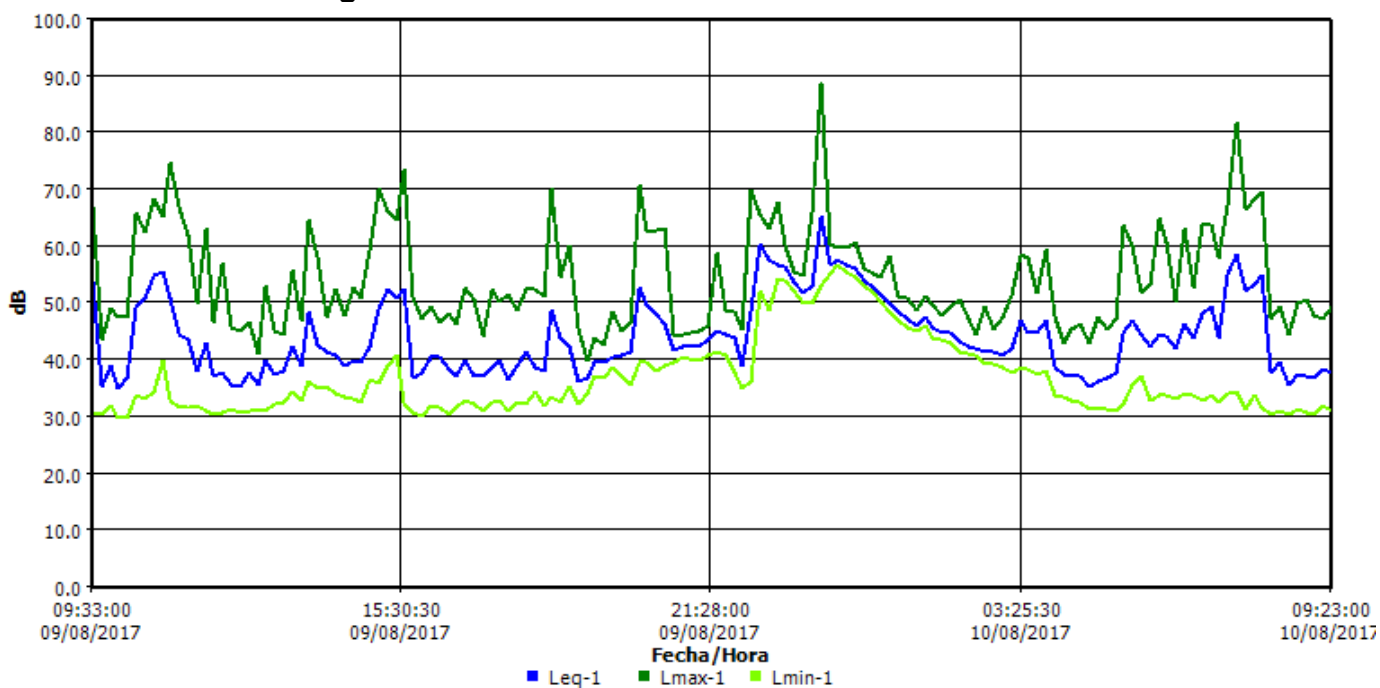
## Panel de información

**Ubicación** Depósito de suelos, a inmediaciones de Aldea Los Planes  
**Nombre** ER-1  
**Sesión padre** S212  
**Hora de inicio** Miércoles, 09 de Agosto de 2017 09:23:00  
**Hora de paro** Jueves, 10 de Agosto de 2017 09:23:00  
**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	SLOW
Lmin	1	29.9 dB	Lmax	1	88.9 dB
Lpk	1	110 dB	Leq	1	50.1 dB

## Gráfica de datos de registro



# ER-2

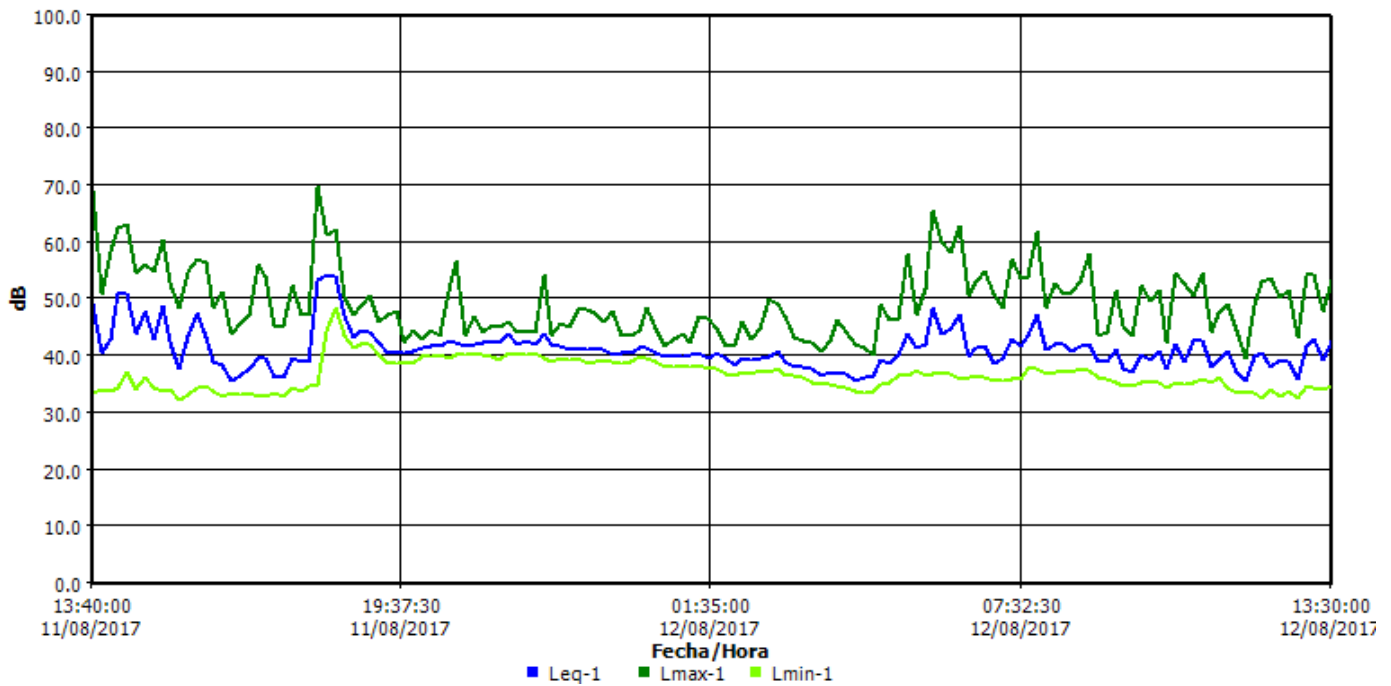
## Panel de información

**Ubicación** Aldea La Cuchilla  
**Nombre** ER-2  
**Sesión padre** S213  
**Hora de inicio** Viernes, 11 de Agosto de 2017 13:30:00  
**Hora de paro** Sábado, 12 de Agosto de 2017 13:30:00  
**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	SLOW
Lmin	1	32.3 dB	Lmax	1	70 dB
Lpk	1	92.3 dB	Leq	1	43.3 dB

## Gráfica de datos de registro





# ER-3

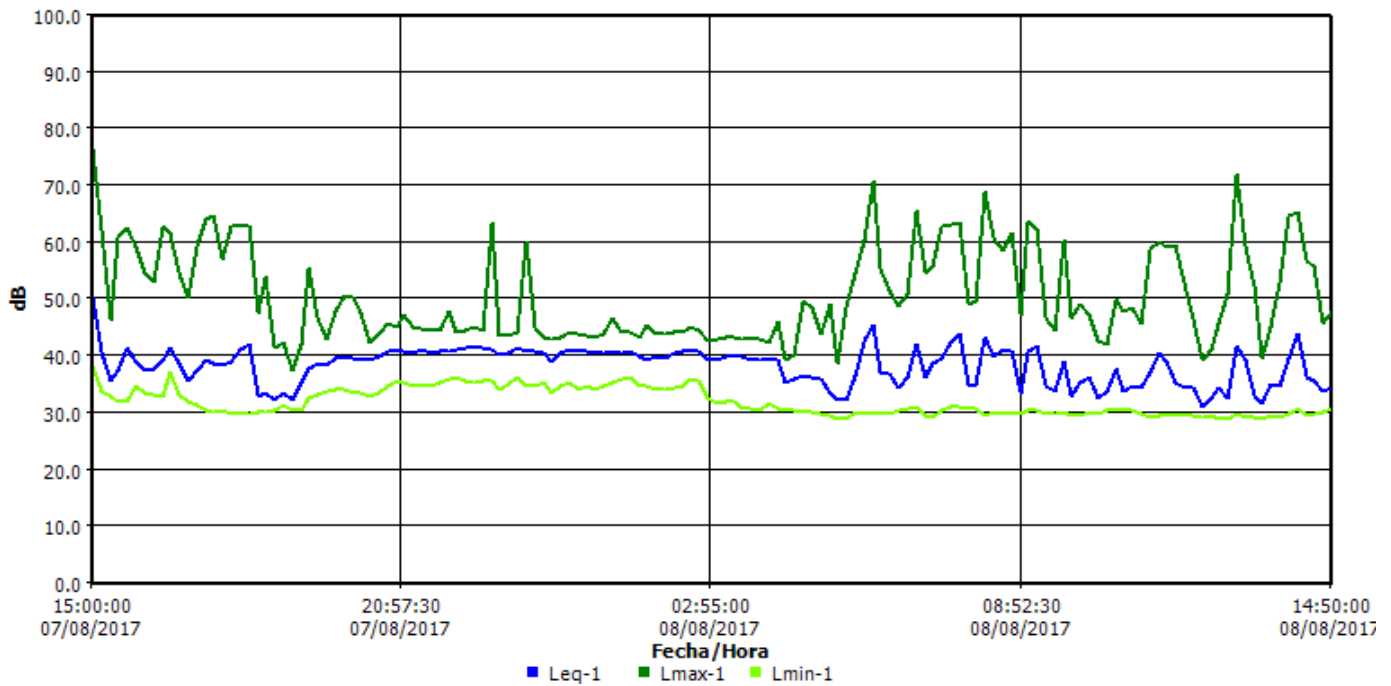
## Panel de información

**Ubicación** Área Este del proyecto, a inmediaciones de Aldea El Fucio  
**Nombre** ER-3  
**Sesión padre** S284  
**Hora de inicio** Lunes, 07 de Agosto de 2017 14:50:00  
**Hora de paro** Martes, 08 de Agosto de 2017 14:50:00  
**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	A	Respuesta	1	FAST
Lmin	1	28.8 dB	Lmax	1	76.4 dB
Lpk	1	98.2 dB	Leq	1	39.5 dB

## Gráfica de datos de registro



# ER-7A

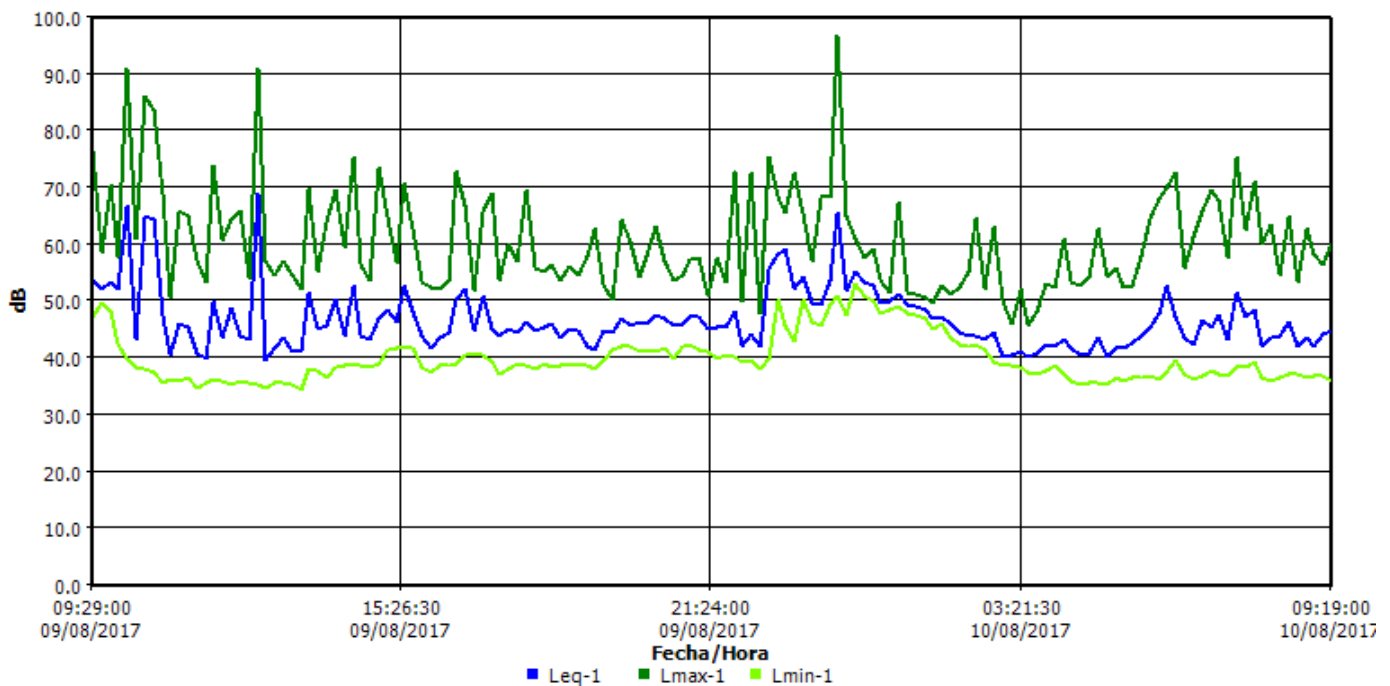
## Panel de información

**Ubicación** Al noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, jurisdicción de Aldea Los Planes, aguas arriba del depósito de colas y de GW-5.  
**Nombre** ER-7A  
**Sesión padre** S285  
**Hora de inicio** Miércoles, 09 de Agosto de 2017 09:19:00  
**Hora de paro** Jueves, 10 de Agosto de 2017 09:19:00  
**Nombre del usuario**

## Panel general de datos

Descripción	Medidor/Sensor	Valor	Descripción	Medidor/Sensor	Valor
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	34.4 dB	Lmax	1	96.7 dB
Lpk	1	113.6 dB	Leq	1	53.4 dB

## Gráfica de datos de registro



# ER-1A

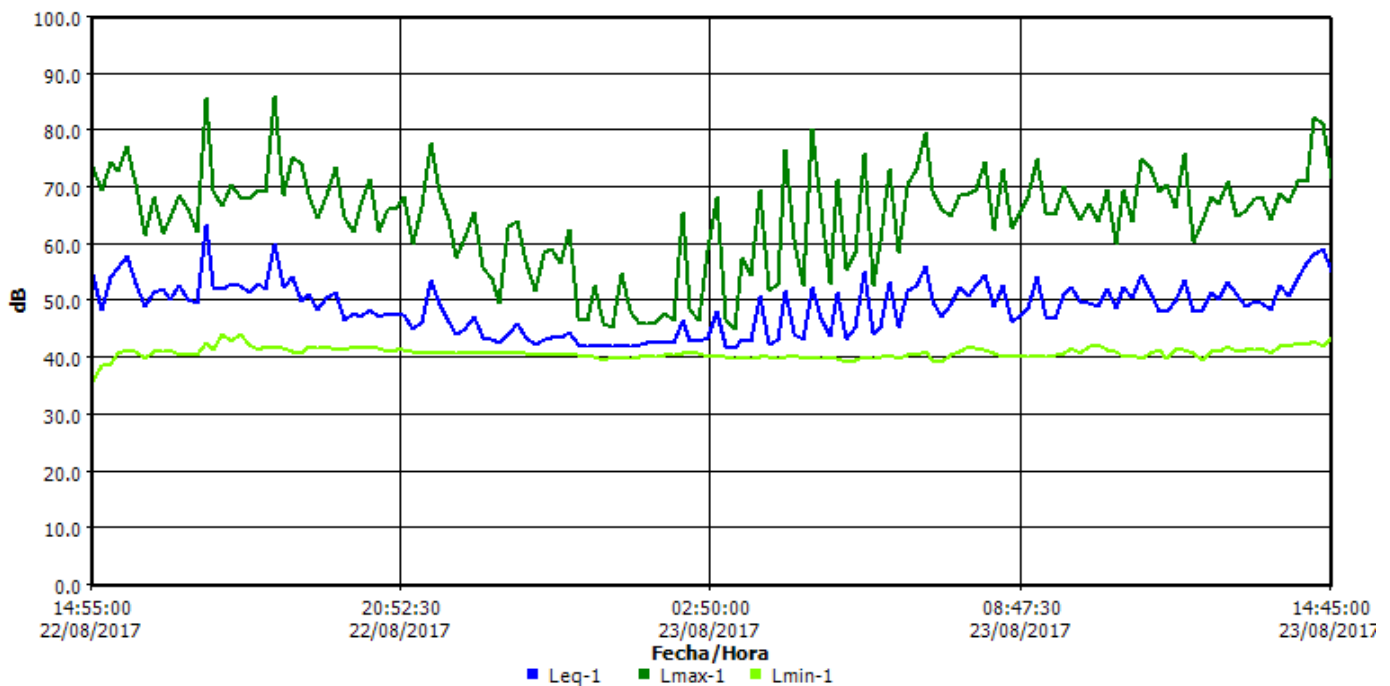
## Panel de información

**Ubicación** Poblado San Rafael las Flores, cercano a la Escuela  
**Nombre** ER-1A  
**Sesión padre** S288  
**Hora de inicio** Martes, 22 de Agosto de 2017 14:45:00  
**Hora de paro** Miércoles, 23 de Agosto de 2017 14:45:00  
**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	35.9 dB	Lmax	1	86.1 dB
Lpk	1	102 dB	Leq	1	51.4 dB

## Gráfica de datos de registro



# ER-3A

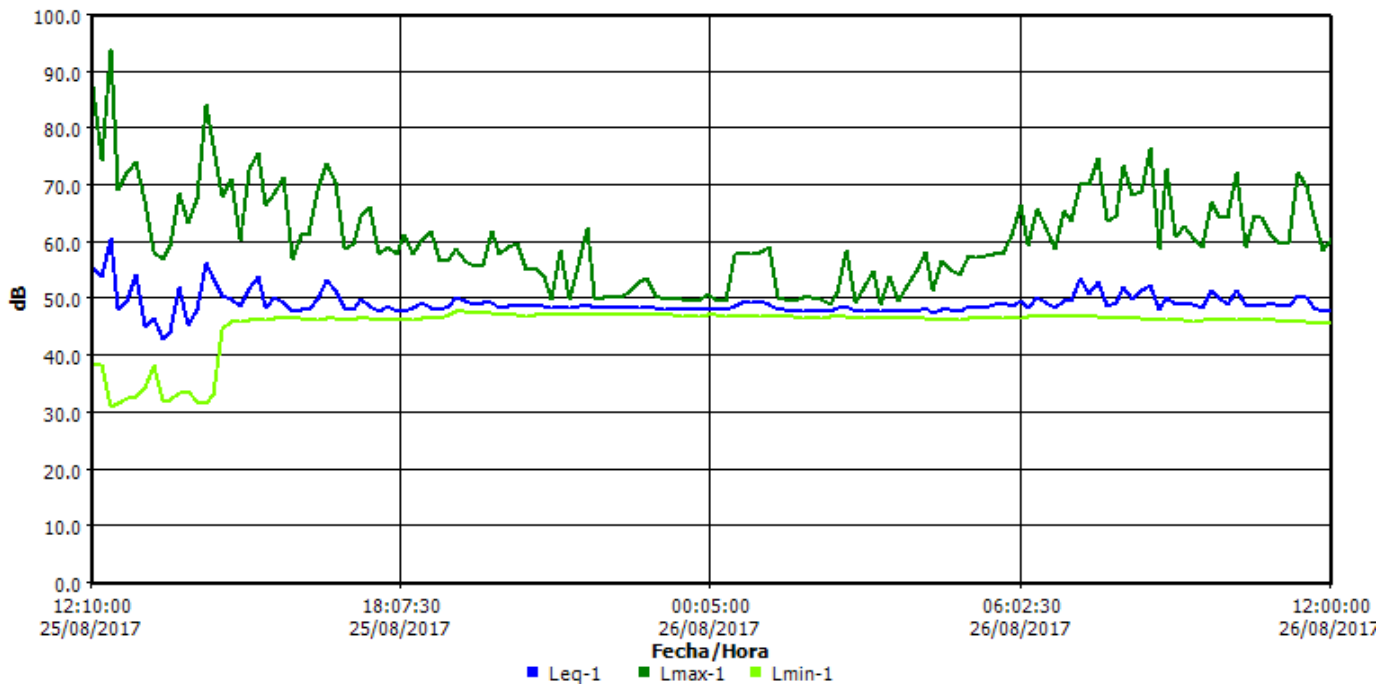
## Panel de información

**Ubicación** Aledaño a Aldea El Fucio  
**Nombre** ER-3A  
**Sesión padre** S289  
**Hora de inicio** Viernes, 25 de Agosto de 2017 12:00:00  
**Hora de paro** Sábado, 26 de Agosto de 2017 12:00:00  
**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	30.9 dB	Lmax	1	94 dB
Lpk	1	110 dB	Leq	1	49.9 dB

## Gráfica de datos de registro





# ER-4A

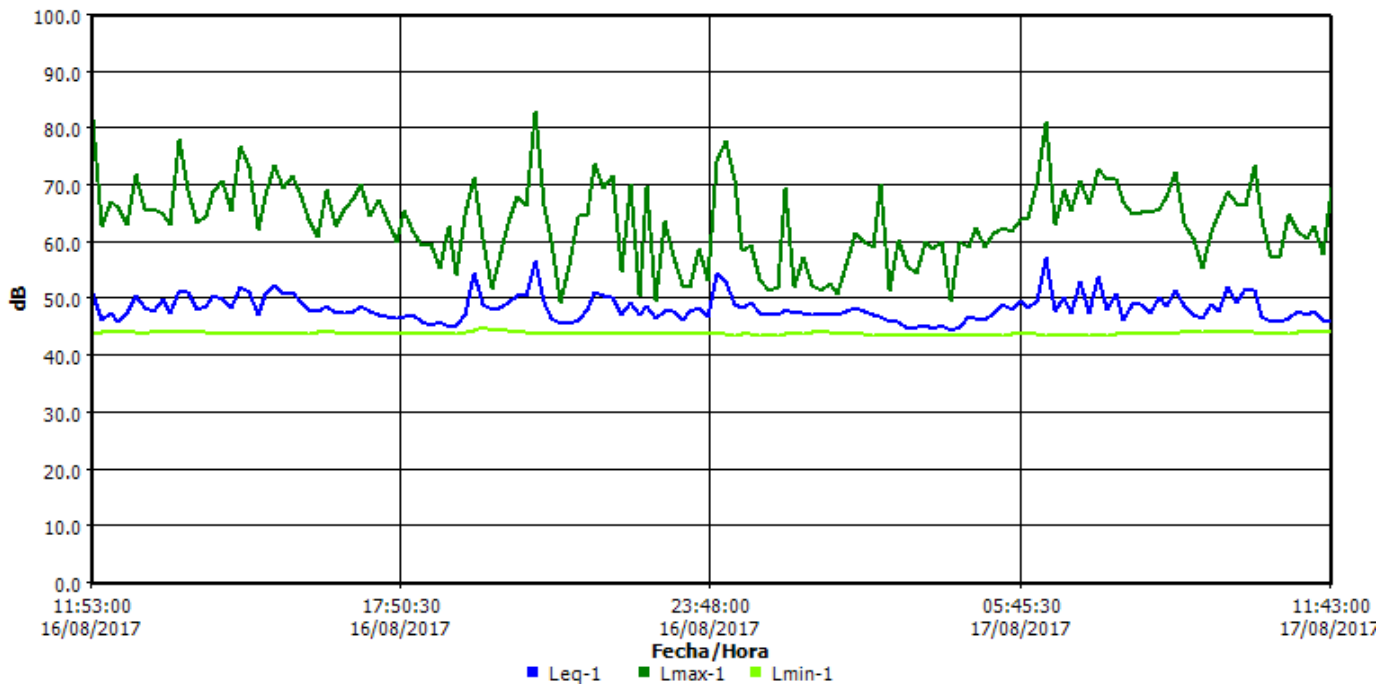
## Panel de información

**Ubicación** Caserío El Portón de los Ángeles  
**Nombre** ER-4A  
**Sesión padre** S065  
**Hora de inicio** Miércoles, 16 de Agosto de 2017 11:43:00  
**Hora de paro** Jueves, 17 de Agosto de 2017 11:43:00  
**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	43.6 dB	Lmax	1	83 dB
Lpk	1	96.6 dB	Leq	1	49.1 dB

## Gráfica de datos de registro



# ER-5A

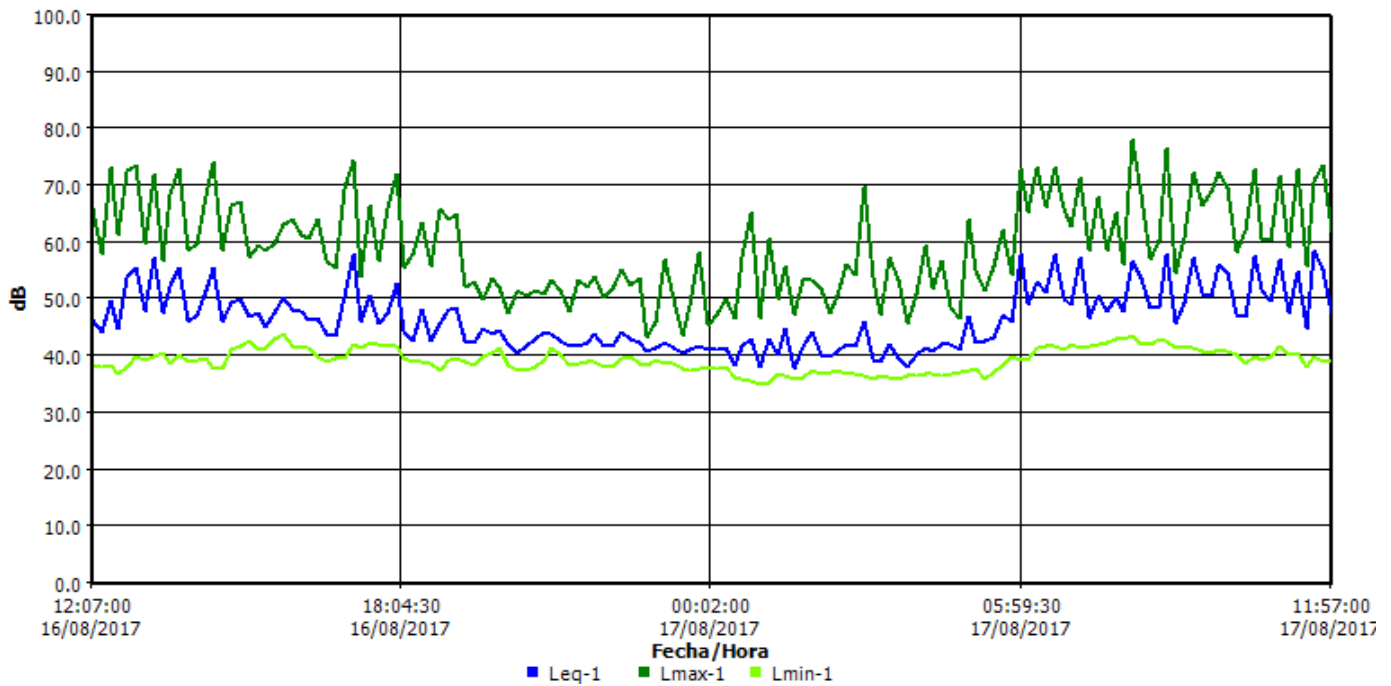
## Panel de información

**Ubicación** Aldea Sabana Redonda, al sur-oeste del proyecto  
**Nombre** ER-5A  
**Sesión padre** S215  
**Hora de inicio** Miércoles, 16 de Agosto de 2017 11:57:00  
**Hora de paro** Jueves, 17 de Agosto de 2017 11:57:00  
**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	SLOW
Lmin	1	35 dB	Lmax	1	78 dB
Lpk	1	110.4 dB	Leq	1	50 dB

## Gráfica de datos de registro



# ER-6

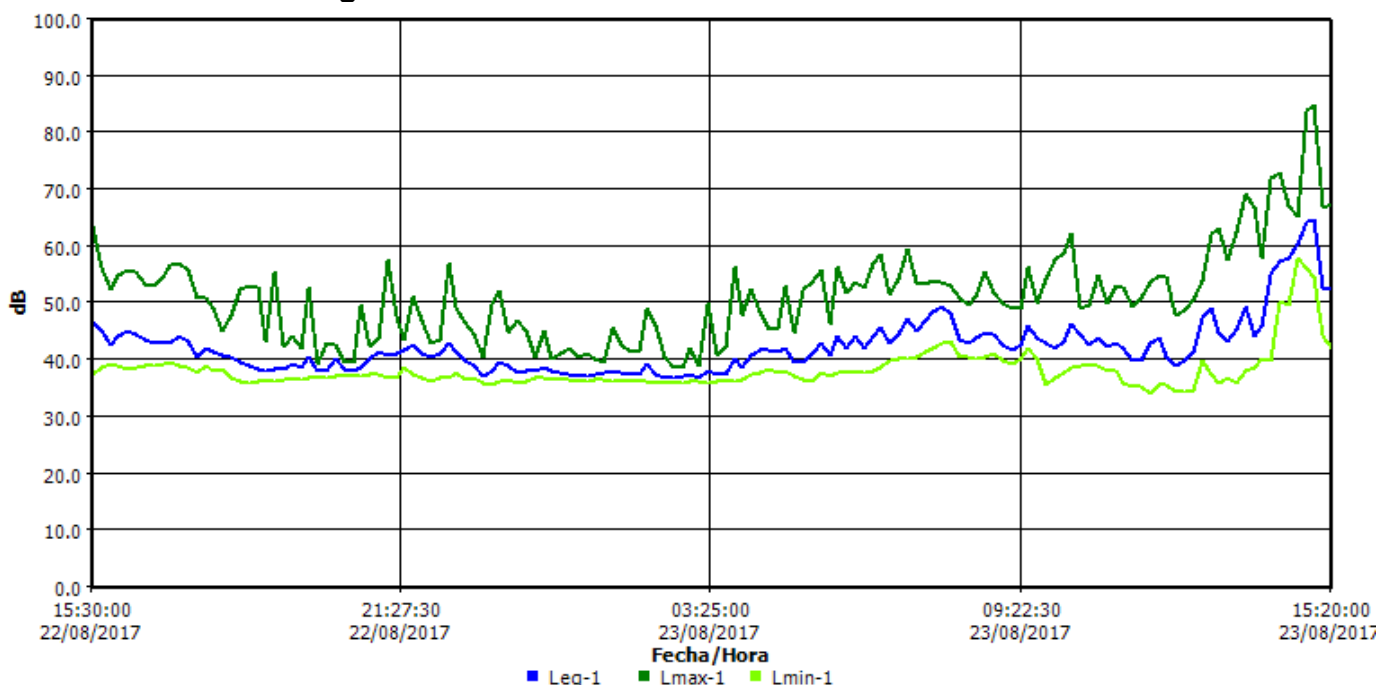
## Panel de información

**Ubicación** Al norte del proyecto, ruta a Mataquescuintla  
**Nombre** ER-6  
**Sesión padre** S216  
**Hora de inicio** Martes, 22 de Agosto de 2017 15:20:00  
**Hora de paro** Miércoles, 23 de Agosto de 2017 15:20:00  
**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	SLOW
Lmin	1	34.2 dB	Lmax	1	84.9 dB
Lpk	1	106.4 dB	Leq	1	48.8 dB

## Gráfica de datos de registro



# ER-1

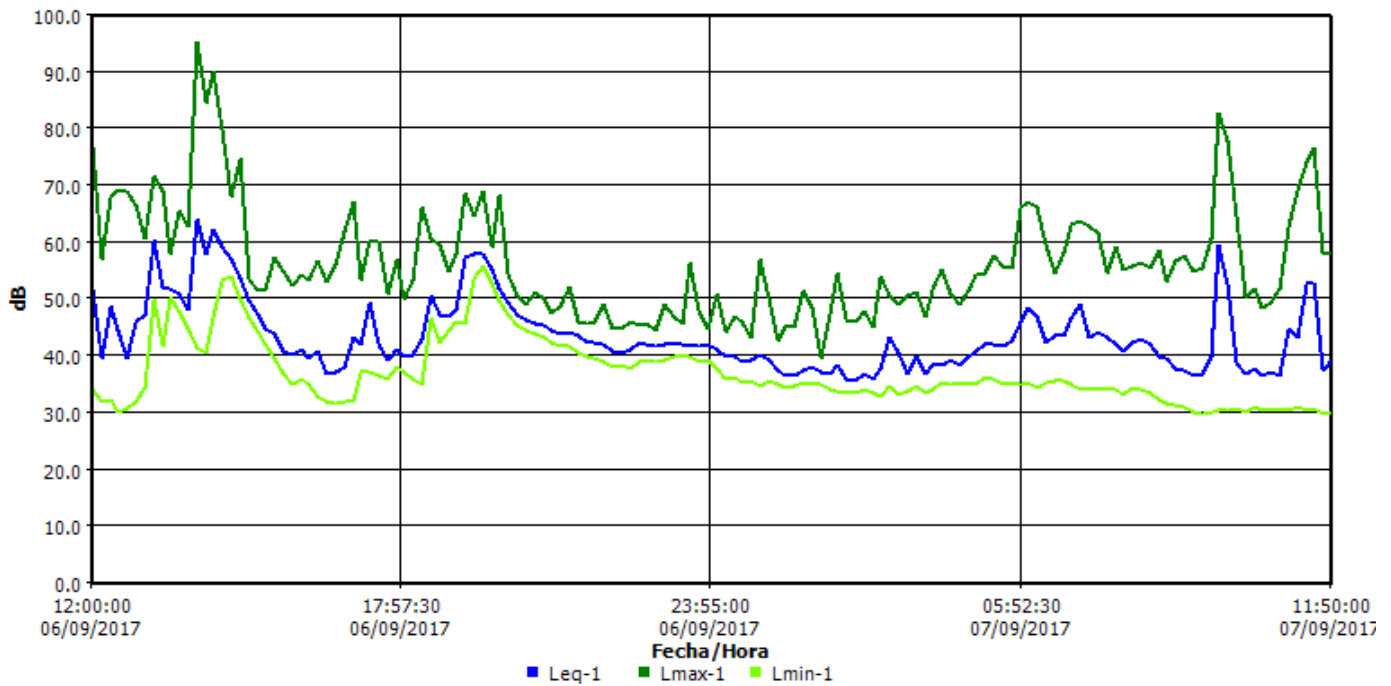
## Panel de información

**Ubicación** Depósito de suelos, a inmediaciones de Aldea Los Planes  
**Nombre** ER-1  
**Sesión padre** S292  
**Hora de inicio** Miércoles, 06 de Septiembre de 2017 11:50:00  
**Hora de paro** Jueves, 07 de Septiembre de 2017 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	A	Respuesta	1	FAST
Lmin	1	29.8 dB	Lmax	1	95.2 dB
Lpk	1	111.5 dB	Leq	1	50 dB

## Gráfica de datos de registro





# ER-2

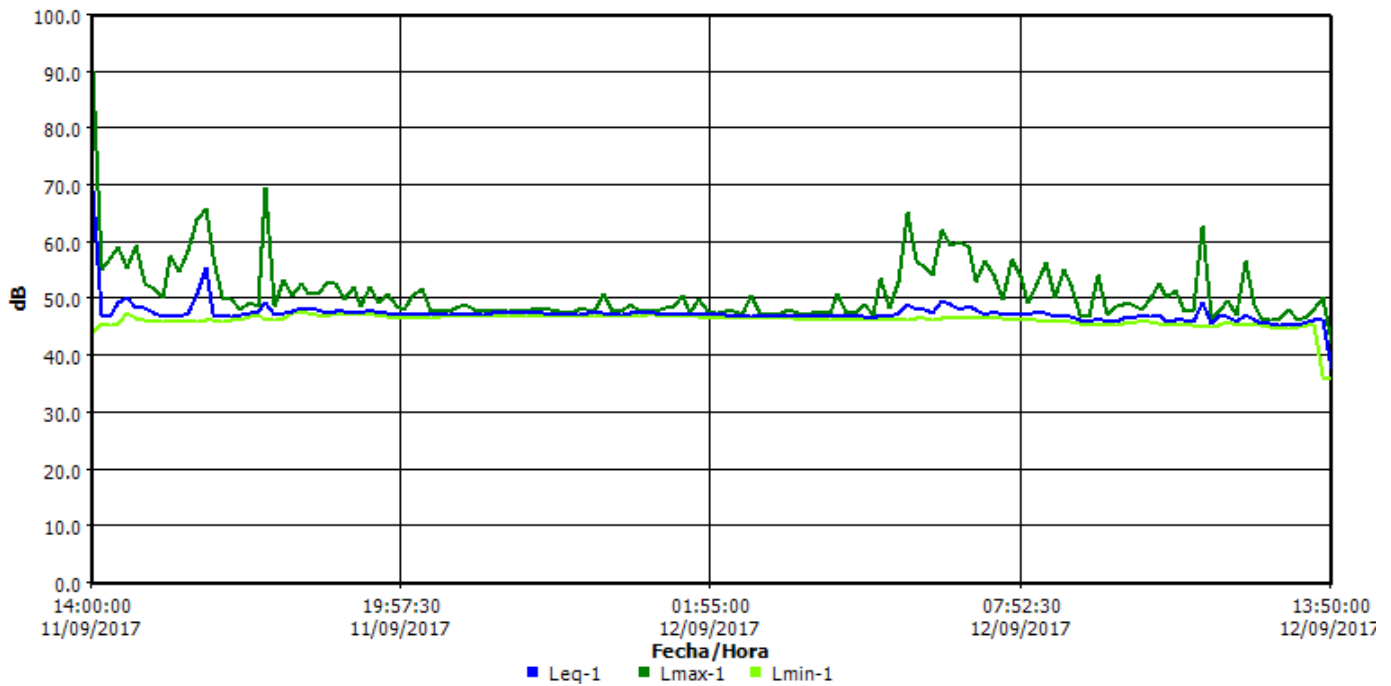
## Panel de información

Ubicación Aldea La Cuchilla  
Nombre ER-2  
Sesión padre S219  
Hora de inicio Lunes, 11 de Septiembre de 2017 13:50:00  
Hora de paro Martes, 12 de Septiembre de 2017 13:50:00  
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	100 dB
Ponderación	1	A	Respuesta	1	SLOW
Lmin	1	36 dB	Lmax	1	90.5 dB
Lpk	1	125.4 dB	Leq	1	50.4 dB

## Gráfica de datos de registro



# ER-3

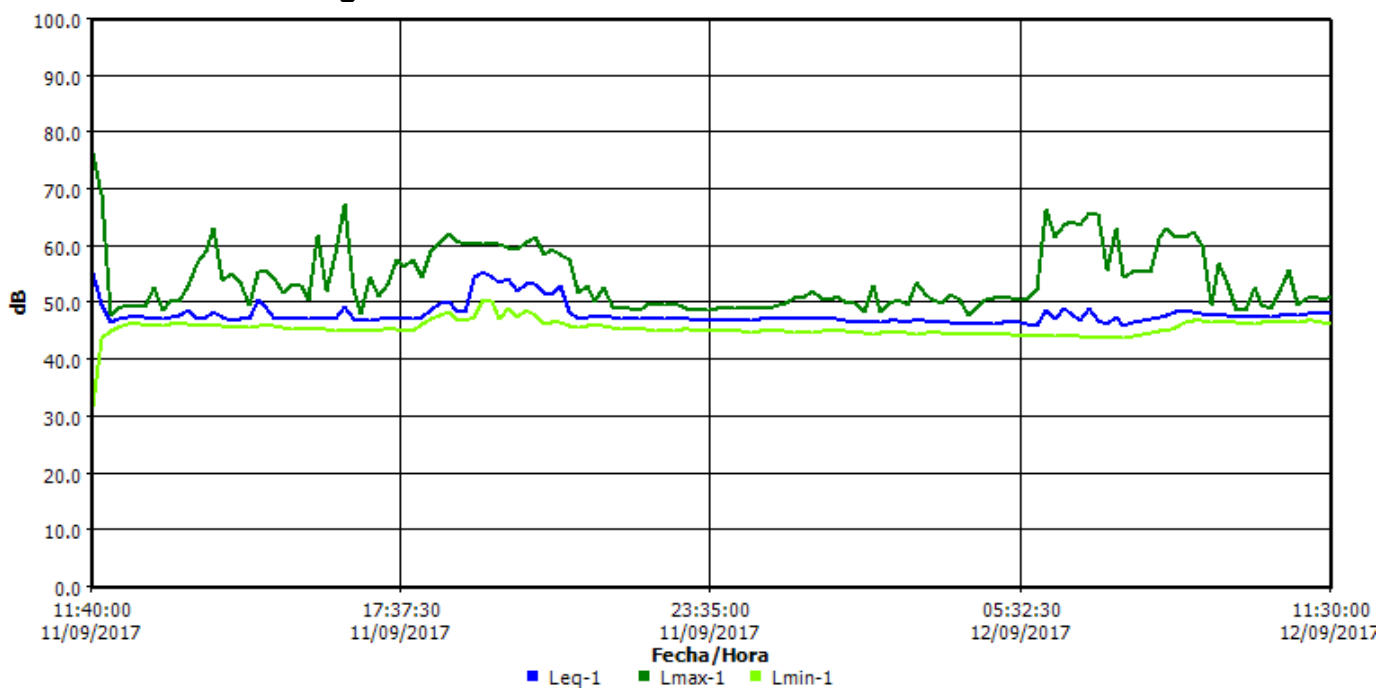
## Panel de información

**Ubicación** Área Este del proyecto, a inmediaciones de Aldea El Fucio.  
**Nombre** ER-3  
**Sesión padre** S294  
**Hora de inicio** Lunes, 11 de Septiembre de 2017 11:30:00  
**Hora de paro** Martes, 12 de Septiembre de 2017 11:30:00  
**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	32.1 dB	Lmax	1	76.3 dB
Lpk	1	93.7 dB	Leq	1	48.5 dB

## Gráfica de datos de registro



# ER-7A

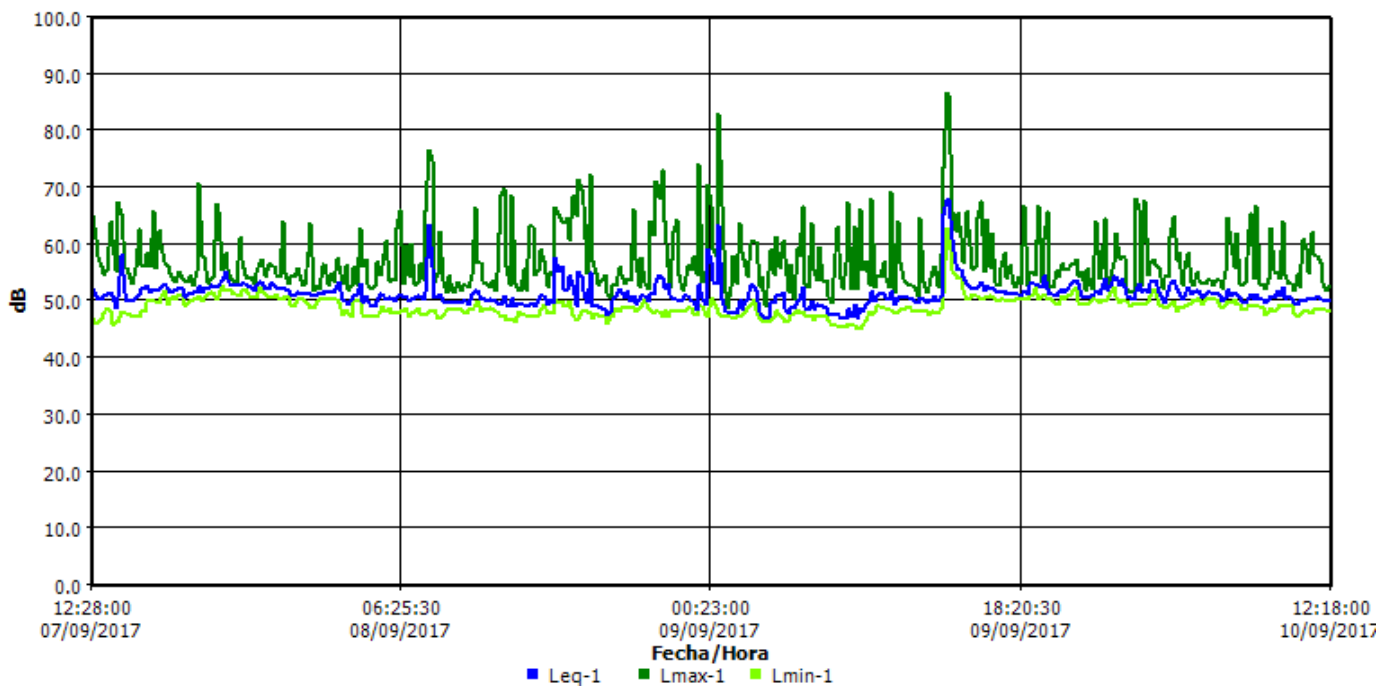
## Panel de información

**Ubicación** Al noreste de pileta de agua de proceso y pileta de cumplimiento ambiental,  
Jurisdicción de Aldea Los Planes  
**Nombre** ER-7A  
**Sesión padre** S069  
**Hora de inicio** Jueves, 07 de Septiembre de 2017 12:18:00  
**Hora de paro** Domingo, 10 de Septiembre de 2017 12:18:00  
**Nombre del usuario**

## Panel general de datos

Descripción	Medidor/Sensor	Valor	Descripción	Medidor/Sensor	Valor
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	SLOW
Lmin	1	45.1 dB	Lmax	1	86.6 dB
Lpk	1	109.5 dB	Leq	1	52.7 dB

## Gráfica de datos de registro



# ER-1

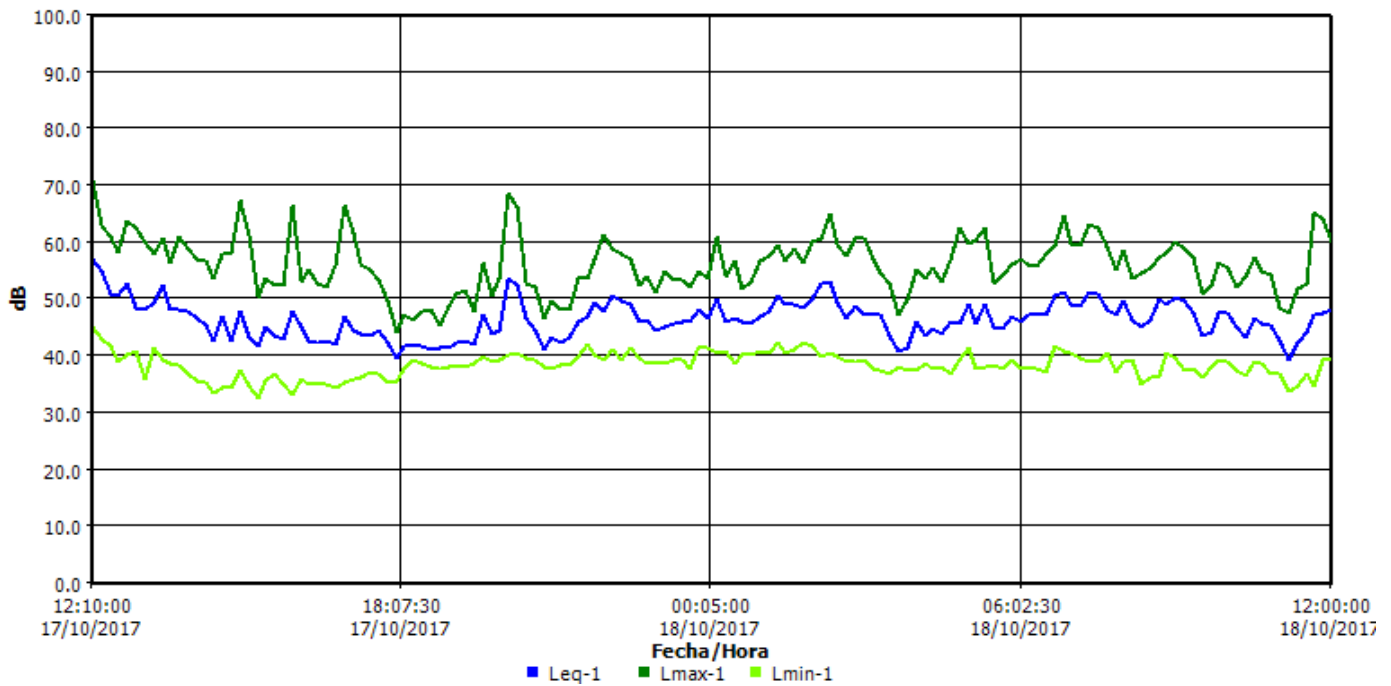
## Panel de información

**Ubicación** Depósito de suelos, a inmediaciones de Aldea Los Planes  
**Nombre** ER-1  
**Sesión padre** S224  
**Hora de inicio** Martes, 17 de Octubre de 2017 12:00:00  
**Hora de paro** Miércoles, 18 de Octubre de 2017 12:00:00  
**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	100 dB
Ponderación	1	A	Respuesta	1	SLOW
Lmin	1	32.5 dB	Lmax	1	70.9 dB
Lpk	1	96.6 dB	Leq	1	47.7 dB

## Gráfica de datos de registro





# ER-2

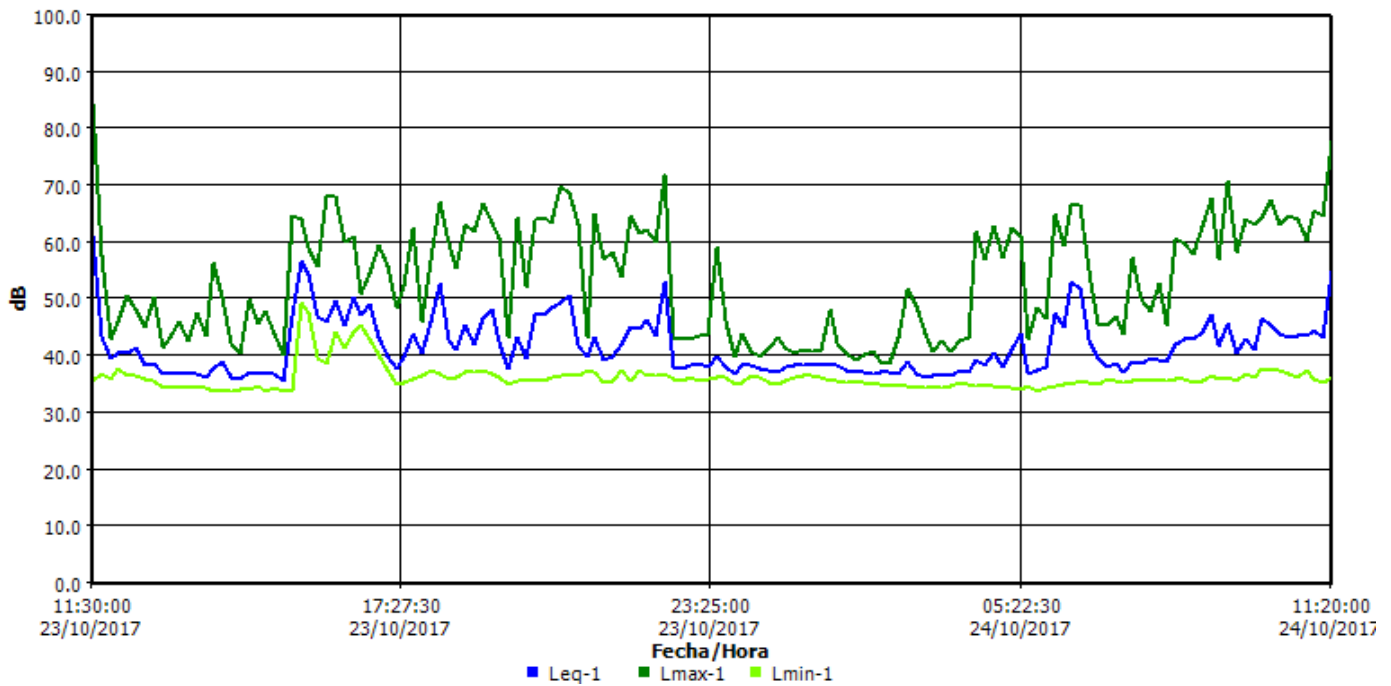
## Panel de información

**Ubicación** Aldea La Cuchilla  
**Nombre** ER-2  
**Sesión padre** S226  
**Hora de inicio** Lunes, 23 de Octubre de 2017 11:20:00  
**Hora de paro** Martes, 24 de Octubre de 2017 11:20:00  
**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	SLOW
Lmin	1	33.7 dB	Lmax	1	84.5 dB
Lpk	1	123 dB	Leq	1	45.9 dB

## Gráfica de datos de registro



# ER-3

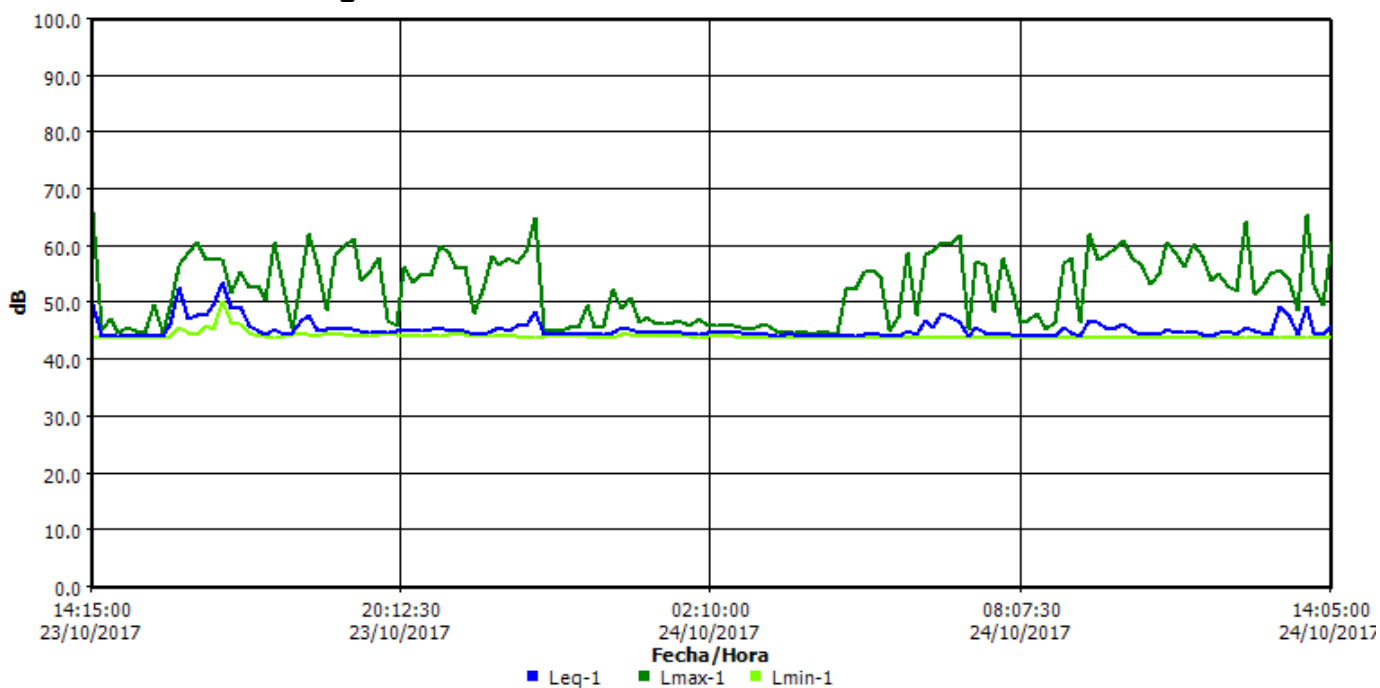
## Panel de información

**Ubicación** Área Este del proyecto, a inmediaciones de aldea El Fucio.  
**Nombre** ER-3  
**Sesión padre** S072  
**Hora de inicio** Lunes, 23 de Octubre de 2017 14:05:00  
**Hora de paro** Martes, 24 de Octubre de 2017 14:05:00  
**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	SLOW
Lmin	1	43.9 dB	Lmax	1	65.9 dB
Lpk	1	95.5 dB	Leq	1	45.7 dB

## Gráfica de datos de registro



# ER-7A

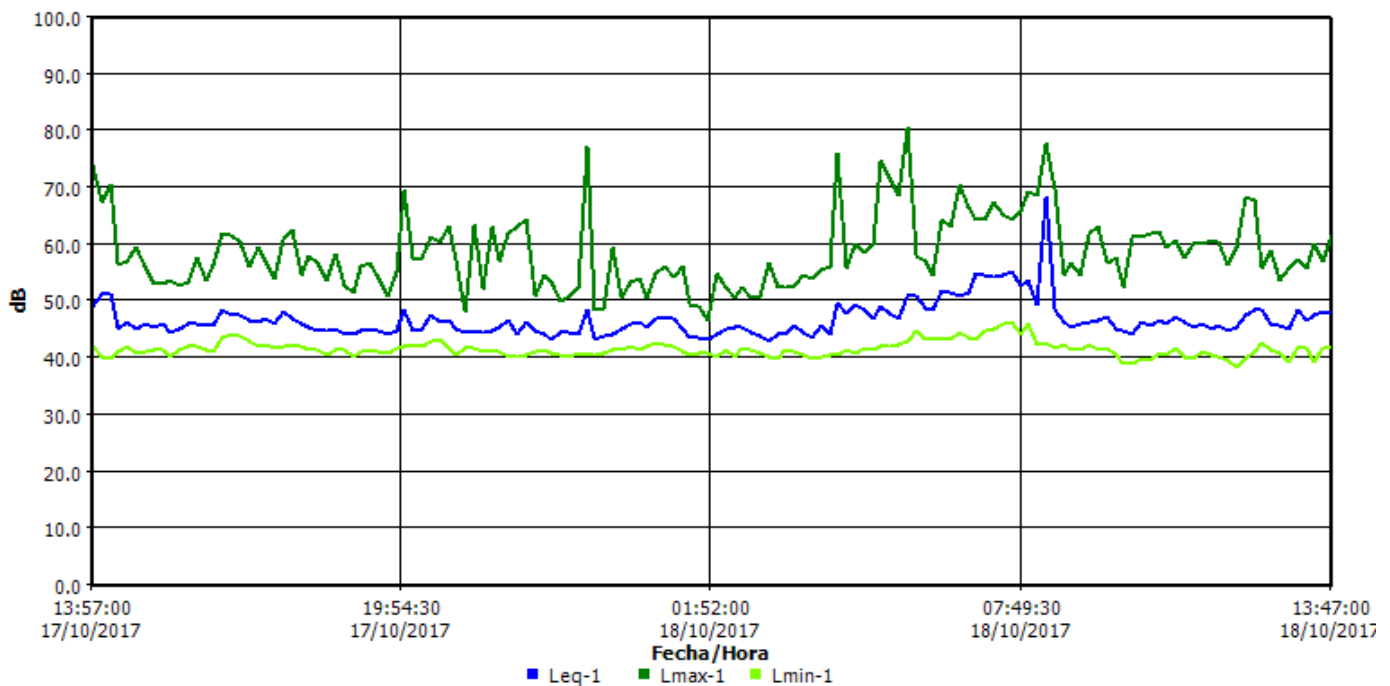
## Panel de información

**Ubicación** Al noreste de pileta de agua de proceso y pileta de cumplimiento ambiental, jurisdicción de Aldea Los Planes.  
**Nombre** ER-7A  
**Sesión padre** S299  
**Hora de inicio** Martes, 17 de Octubre de 2017 13:47:00  
**Hora de paro** Miércoles, 18 de Octubre de 2017 13:47:00  
**Nombre del usuario**

## Panel general de datos

Descripción	Medidor/Sensor	Valor	Descripción	Medidor/Sensor	Valor
Índice de intercambio	1	3 dB	Umbral int.	1	80 dB
Ponderación	1	A	Respuesta	1	FAST
Lmin	1	38.4 dB	Lmax	1	80.6 dB
Lpk	1	99.5 dB	Leq	1	50.3 dB

## Gráfica de datos de registro



## **12.4 Certificados de verificación de los equipos utilizados**

### **12.4.1 Material Particulado (PM<sub>10</sub>) y Presión Sonora**



**CERTIFICADO DE VERIFICACIÓN DE CALIBRACIÓN DE  
SONÓMETROS  
Aug-17**

Certificado Numero: 2148

**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**

<b>Equipo No.:</b> 3	<b>Fecha de Verificación de Calibración:</b> 08/08/17	m/d/a
<b>Número de Serie :</b> BGK080007	<b>Vigencia:</b> 30 Días	

Valores Ambientales	
<b>Temperatura °C</b>	21.30
<b>Presión (Pulg. Hg)</b>	24.40
<b>Humedad Relativa (%):</b>	60.00

<b>Lectura de Calibración</b>	114.00	dB
<b>Relectura</b>	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:** 05/18/16  
**Certificado No.:** ICA- 677916

**Responsables**

*Luis Rey*

**Luis Rey**  
Responsable

*Hasan Zolata*

**Ing. Hasan Zolata**  
Supervisor

**CERTIFICADO DE VERIFICACIÓN DE CALIBRACIÓN DE  
SONÓMETROS**

**Aug-17**

**Falla reportada**

Cliente solicita revisión y mantenimiento general.

**Observaciones**

Equipo kit outdoor tiene las llantas muy dañadas.

**Diagnostico**

Después de revisar el equipo, se procedió a hacer una corrida de prueba de 72 hrs encontrando que el equipo funciona correctamente, se realizará 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 medición de sonido.
- Revisión de kit outdoor.



**Repuestos utilizados**

- Llantas de kit outdoor.

**Responsables:**

*Luis Rey*

**Luis Rey**  
Responsable

*Hasan Zolata*

**Ing. Hasan Zolata**  
Supervisor

# Consultoría y Tecnología Ambiental S.A.

## Reporte de sesión

08/08/2017

### Información general

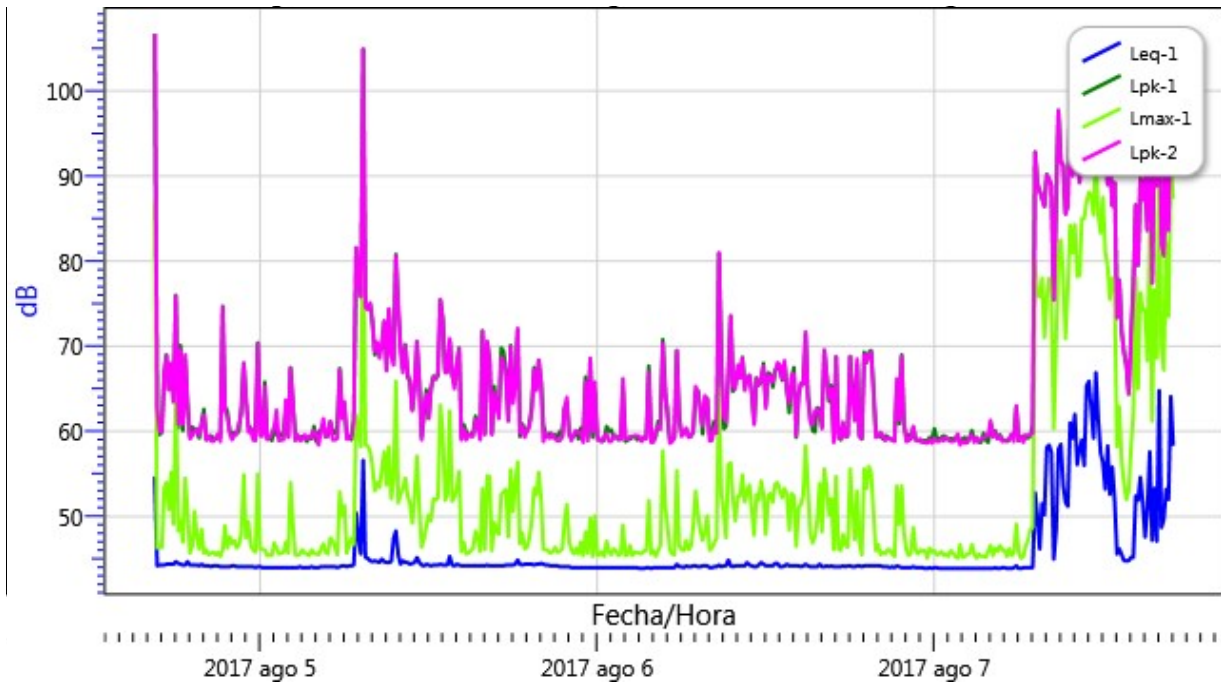
Nombre	S064_BGK080007_08082017_104137
Hora de inicio	04/08/2017 04:19:56 p.m.
Nombre del dispositivo	BGK080007
Tipo de modelo	SoundPro DL
Revisión del firmware del dispositivo	R.13F
Hora de paro	07/08/2017 05:05:03 p.m.
Duración:	3.00:45:07

### Panel de datos de resumen

Descripción	Medidor	Valor	Descripción	Medidor	Valor
Leq	1	50.5 dB	CNEL	1	53.1 dB
Dose8	1	0 %	Dosis	1	0.3 %
Horas de exp.	1	0 Pa <sup>2</sup> -Hours	L10	1	45 dB
L50	1	44 dB	LDN	1	53 dB
Lmax	1	93.5 dB	Lmin	1	43.5 dB
Lpk	1	116 dB	OL%	1	0 %
PKtime	1	07/08/2017 05:05:00 p.m.	ProjectedTWA (8:00)	1	50.5 dB
Promedio ponderado de tiempo (TWA)	1	60.1 dB	Rtime	1	3.00:45:07
Segundos de exp.	1	11.8 Pa <sup>2</sup> -Sec	SEL	1	104.7 dB
Takt	1	58 dB	UL, tiempo superior	límite 1	00:00:00
Índice de intercambio	1	3 dB	Ponderación	1	A
Respuesta	1	FAST	Ancho de banda	1	OFF
Índice de intercambio	2	3 dB	Ponderación	2	A
Respuesta	2	FAST			

## Gráfica de datos de registro

S064\_BGK080007\_08082017\_104137: Gráfica de datos de registro





**CERTIFICADO DE VERIFICACIÓN DE CALIBRACIÓN DE EQUIPOS  
PARA MEDICIÓN DE TSP, PM<sub>2.5</sub> Y PM<sub>10</sub>**

**Oct-17**

Certificado Numero: 2147

**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**

<b>Equipo No.:</b>	<b>1</b>	<b>Fecha de Verificación de Calibración:</b>	<b>10/18/17</b>
<b>Número de Serie :</b>	<b>938</b>	<b>Vigencia:</b>	<b>30 Días</b>

Valores Ambientales	
Temperatura (°C)	22.50
Presión (Pulg.Hg)	24.38
Humedad Relativa ( %)	63.00

Parámetro	Lectura Calibración PQ200	Lectura Patrón
Flujo (LPM)	16.73	16.70*
Temperatura Ambiente (°C)	22.50	22.50*
Temperatura Filtro (°C)	22.50	22.50*
Barómetro (Pulg.Hg)	24.38	24.38*

Test de vacio		
SP (cm H <sub>2</sub> O)	35.00	SP < 33
Pi - Vacio inicial (cm H <sub>2</sub> O)	99.00	ΔP < 5
Pf - Vacio final (cm H <sub>2</sub> 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:** 05/12/16

**Responsables:**

*Luis Rey*

**Luis Rey**  
Responsable

*Hasan Zolata*

**Ing. Hasan Zolata**  
Supervisor

#### Falla reportada

Cliente solicita revisión y mantenimiento general.

#### Observaciones

Revisión general.

#### Diagnostico

Después de cargar al 100% el equipos, se procedió a correr una prueba de 24 hrs. configurado a 16.7 LPM, encontrando que el equipo funciona correctamente. Se realizará mantenimiento general de todos sus componentes.

#### Trabajos realizados

##### Mantenimiento de los siguientes componentes:

- bomba de vacio (diarragmas, vaivutas, ejes)
- Motor eléctrico
- Sensor de flujo másico
- Conexiones del circuito de vacio
- Sistema mecánico de Porta filtro
- Mantenimiento de tarjeta electrónica.
- Ventilador
- 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 26 horas exitosas.

#### Repuestos utilizados

- Ninguno.

#### Responsables:



CONSULTORIA Y TECNOLOGIA AMBIENTAL, S.A.

# BGI PQ200 Air Sampling System Downloaded 2017 18 oct 07:37:43

**Job Details:**

Job Name:  
Version: 5.62  
Serial No: 938  
Pump Time: 5239:00  
Flags: P

Job Code: 1  
Site Name: CTA  
Station Code: LABEL  
Operators: LREY  
User1:  
User2:

	Max	Min	Avg	Units
BP	621	617	619	mmHg
TA	22	15.7	18.2	°C
Q	---	---	16.71	Lpm

**Timer Information:**

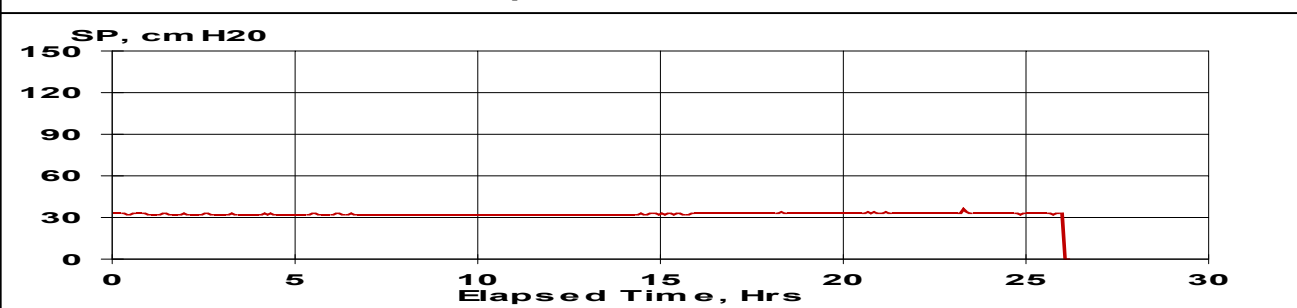
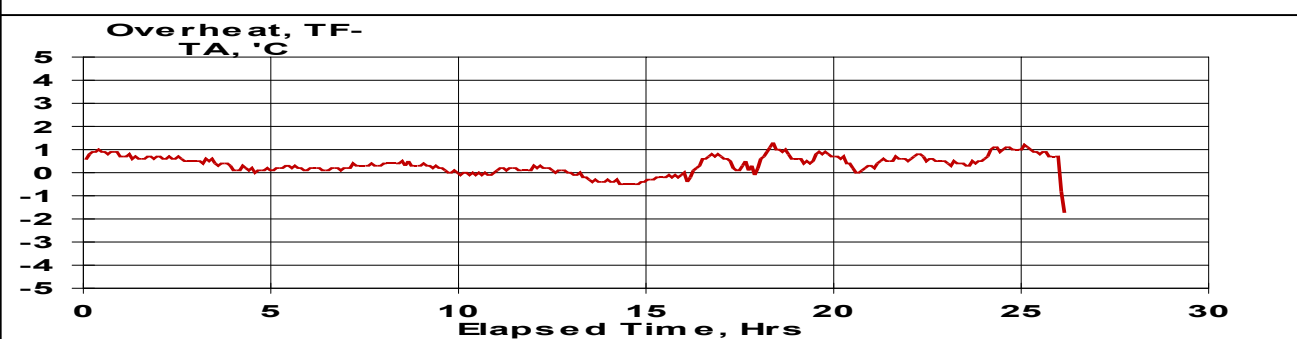
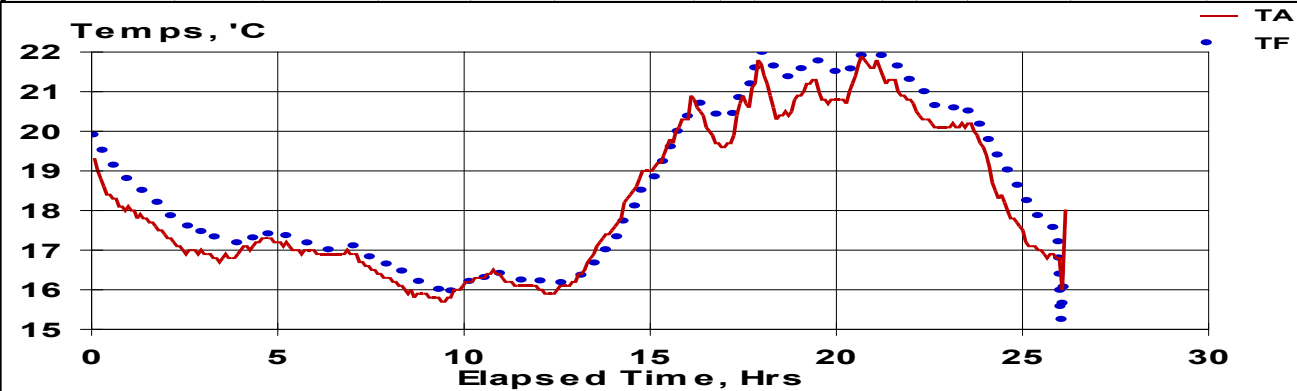
	Date	Time
	dd-mmm	hh:mm:ss
Start:	17-16-oct	17:23:08
Stop:	17-17-oct	19:38:05
ET:	26:14:00	

**Mass Concentration Data:**

Filter ID:	
Final Wt:	mg
Initial Wt:	mg
Delta Wt:	0.000 mg
Total Vol:	26.3 m <sup>3</sup>
Mass Conc:	0 µg/m <sup>3</sup>

QCV 0.69 %  
Max overheat 1.4 °C  
occured 17-oct 19:41:10

Notes 1: Corrida de 26 hrs  
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
17-16-oct	17:28:08	619	18.5	19.3	0.9	33	16.72
17-16-oct	18:28:08	620	17.7	18.4	0.7	32	16.72
17-16-oct	19:28:08	620	17.1	17.7	0.6	32	16.72
17-16-oct	20:28:08	621	16.8	17.3	0.4	32	16.72
17-16-oct	21:28:08	621	17.2	17.3	0.1	32	16.72
17-16-oct	22:28:08	621	17.1	17.3	0.2	32	16.72
17-16-oct	23:28:08	620	16.9	17.1	0.2	32	16.72
17-17-oct	0:28:08	620	16.6	16.9	0.3	32	16.71
17-17-oct	1:28:08	619	16.1	16.4	0.4	32	16.72
17-17-oct	2:28:08	619	15.8	16.1	0.2	32	16.72
17-17-oct	3:28:08	619	16.3	16.2	0.0	32	16.73
17-17-oct	4:28:08	619	16.2	16.3	0.1	32	16.72
17-17-oct	5:28:08	620	16.0	16.2	0.2	32	16.72
17-17-oct	6:28:08	620	16.7	16.5	-0.2	32	16.72
17-17-oct	7:28:08	621	18.0	17.6	-0.4	32	16.71
17-17-oct	8:28:08	621	19.3	19.1	-0.3	33	16.72
17-17-oct	9:28:08	621	20.4	20.5	0.1	33	16.71
17-17-oct	10:28:08	621	20.1	20.6	0.5	33	16.72
17-17-oct	11:28:08	620	21.0	21.6	0.7	33	16.72
17-17-oct	12:28:08	620	20.9	21.6	0.6	33	16.72
17-17-oct	13:28:08	619	21.0	21.5	0.6	33	16.72
17-17-oct	14:28:08	619	21.5	21.9	0.3	33	16.71
17-17-oct	15:28:08	619	20.6	21.2	0.6	33	16.72
17-17-oct	16:28:08	619	20.1	20.5	0.4	33	16.83
17-17-oct	17:28:08	620	18.5	19.4	0.9	33	16.72
17-17-oct	18:28:08	620	17.1	18.0	0.9	33	16.72
17-17-oct	19:28:08	620	16.9	16.6	-0.3	17	8.36



**12.5 Informe Original de los Resultados Analíticos obtenidos de muestras de agua del Laboratorio ACZ Laboratories, INC. Correspondiente al Monitoreo de Septiembre de 2017**

**12.5.1 Muestras de Agua Superficial (SW)**

October 05, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39772

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 09, 2017. This project has been assigned to ACZ's project number, L39772. 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 L39772. 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 November 04, 2017. 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.

October 05, 2017

Project ID: Escobal

ACZ Project ID: L39772

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 4 miscellaneous samples from Tahoe Resources, Inc. on September 9, 2017. 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 L39772. 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: SW-1

ACZ Sample ID: **L39772-01**  
Date Sampled: 09/04/17 14:20  
Date Received: 09/09/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 14:54	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 16:38	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/22/17 12:39	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:46	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:45	las
Total Hot Plate Digestion	M200.2 ICP-MS								09/22/17 9:52	mfm
Total Hot Plate Digestion	M200.2 ICP								09/19/17 16:40	aeh



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-1

ACZ Sample ID: **L39772-01**

Date Sampled: 09/04/17 14:20

Date Received: 09/09/17

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	09/25/17 22:03	dcm
Aluminum, total	M200.7 ICP	1	1.91		*	mg/L	0.03	0.2	09/26/17 3:37	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/27/17 22:23	mfm
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/28/17 11:44	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0009	B		mg/L	0.0002	0.001	09/26/17 14:07	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0012			mg/L	0.0002	0.001	09/28/17 11:44	msh
Barium, dissolved	M200.7 ICP	1	0.085			mg/L	0.003	0.02	09/25/17 22:03	dcm
Barium, total	M200.7 ICP	1	0.107			mg/L	0.003	0.02	09/26/17 3:37	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:03	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:37	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/25/17 22:03	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/26/17 3:37	dcm
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:03	dcm
Boron, total	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	09/26/17 3:37	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:07	bsu
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/28/17 11:44	msh
Calcium, dissolved	M200.7 ICP	1	21.3			mg/L	0.1	0.5	09/25/17 22:03	dcm
Calcium, total	M200.7 ICP	1	21.5			mg/L	0.1	0.5	09/26/17 3:37	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:03	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:37	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:03	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:37	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:03	dcm
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:37	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/25/17 22:03	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/26/17 3:37	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/27/17 0:08	dcm
Iron, total	M200.7 ICP	1	0.98			mg/L	0.02	0.05	09/26/17 3:37	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:07	bsu
Lead, total	M200.8 ICP-MS	1	0.0007			mg/L	0.0001	0.0005	09/28/17 11:44	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 22:03	dcm
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/26/17 3:37	dcm
Magnesium, dissolved	M200.7 ICP	1	3.3			mg/L	0.2	1	09/25/17 22:03	dcm
Magnesium, total	M200.7 ICP	1	3.4			mg/L	0.2	1	09/26/17 3:37	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/25/17 22:03	dcm
Manganese, total	M200.7 ICP	1	0.071			mg/L	0.005	0.03	09/26/17 3:37	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:11	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:07	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/25/17 22:03	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/26/17 3:37	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 22:03	dcm
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/26/17 3:37	dcm
Potassium, dissolved	M200.7 ICP	1	4.6			mg/L	0.2	1	09/25/17 22:03	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-1

ACZ Sample ID: **L39772-01**  
Date Sampled: 09/04/17 14:20  
Date Received: 09/09/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	4.8			mg/L	0.2	1	09/26/17 3:37	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/25/17 22:03	dcm
Scandium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/26/17 3:37	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	09/26/17 14:07	bsu
Selenium, total	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0003	09/28/17 11:44	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/26/17 14:07	bsu
Silver, total	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/28/17 11:44	msh
Sodium, dissolved	M200.7 ICP	1	8.8			mg/L	0.2	1	09/25/17 22:03	dcm
Sodium, total	M200.7 ICP	1	8.9			mg/L	0.2	1	09/26/17 3:37	dcm
Strontium, dissolved	M200.7 ICP	1	0.119			mg/L	0.005	0.03	09/25/17 22:03	dcm
Strontium, total	M200.7 ICP	1	0.118			mg/L	0.005	0.03	09/26/17 3:37	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:07	bsu
Thallium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 17:39	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/25/17 22:03	dcm
Tin, total	M200.7 ICP	1		U		mg/L	0.04	0.2	09/26/17 3:37	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/25/17 22:03	dcm
Titanium, total	M200.7 ICP	1	0.064			mg/L	0.005	0.03	09/26/17 3:37	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:07	bsu
Uranium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/28/17 11:44	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/25/17 22:03	dcm
Vanadium, total	M200.7 ICP	1		U		mg/L	0.005	0.03	09/26/17 3:37	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:03	dcm
Zinc, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:37	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-1

ACZ Sample ID: **L39772-01**  
 Date Sampled: 09/04/17 14:20  
 Date Received: 09/09/17  
 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	46.9		*	mg/L	2	20	09/16/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Total Alkalinity		1	46.9		*	mg/L	2	20	09/16/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			8.6			%			10/05/17 0:00	calc
Sum of Anions			1.6			meq/L			10/05/17 0:00	calc
Sum of Cations			1.9			meq/L			10/05/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 12:33	emk
Chloride	SM4500Cl-E	1	10.1		*	mg/L	0.5	2	09/12/17 15:51	jmm
Conductivity @25C	SM2510B	1	199		*	umhos/cm	1	10	09/16/17 0:26	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:36	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:21	pjb
Fluoride	SM4500F-C	1	0.13	B	*	mg/L	0.05	0.3	09/14/17 15:53	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		67			mg/L	0.2	5	10/05/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	5.26		*	mg/L	0.06	0.3	09/15/17 23:20	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:56	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	09/22/17 22:49	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	09/16/17 0:00	emk
pH measured at		1	22.0		*	C	0.1	0.1	09/16/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	10/05/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	09/19/17 22:59	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	09/12/17 23:55	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	09/19/17 15:56	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	190		*	mg/L	10	20	09/11/17 14:07	che
Residue, Non-Filterable (TSS) @105C	SM2540D	1	25.0		*	mg/L	5	20	09/11/17 15:41	ecc
Residue, Total (TS) @ 105C	SM2540B	1	226		*	mg/L	10	20	09/11/17 16:23	che
Sulfate	D516-02/-07 - Turbidimetric	1	15.2		*	mg/L	1	5	09/12/17 11:39	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 14:03	emk
TDS (calculated)	Calculation		92.2			mg/L			10/05/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		2.06						10/05/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-2

ACZ Sample ID: **L39772-02**  
Date Sampled: 09/04/17 12:00  
Date Received: 09/09/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 15:01	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 16:52	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/22/17 12:46	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:50	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:49	las
Total Hot Plate Digestion	M200.2 ICP-MS								09/22/17 10:03	mfm
Total Hot Plate Digestion	M200.2 ICP								09/19/17 17:15	aeh



**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-2

ACZ Sample ID: **L39772-02**  
 Date Sampled: 09/04/17 12:00  
 Date Received: 09/09/17  
 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	09/25/17 22:12	dcm
Aluminum, total	M200.7 ICP	1	0.88		*	mg/L	0.03	0.2	09/26/17 3:52	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0004	0.002	09/27/17 22:27	mfm
Antimony, total	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0004	0.002	09/28/17 11:46	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0023			mg/L	0.0002	0.001	09/26/17 14:11	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0025			mg/L	0.0002	0.001	09/28/17 11:46	msh
Barium, dissolved	M200.7 ICP	1	0.083			mg/L	0.003	0.02	09/25/17 22:12	dcm
Barium, total	M200.7 ICP	1	0.091			mg/L	0.003	0.02	09/26/17 3:52	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:12	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:52	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/25/17 22:12	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/26/17 3:52	dcm
Boron, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/25/17 22:12	dcm
Boron, total	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/26/17 3:52	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:11	bsu
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/28/17 11:46	msh
Calcium, dissolved	M200.7 ICP	1	32.4			mg/L	0.1	0.5	09/25/17 22:12	dcm
Calcium, total	M200.7 ICP	1	33.1			mg/L	0.1	0.5	09/26/17 3:52	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:12	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:52	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:12	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:52	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:12	dcm
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:52	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/25/17 22:12	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/26/17 3:52	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/27/17 0:17	dcm
Iron, total	M200.7 ICP	1	0.56			mg/L	0.02	0.05	09/26/17 3:52	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:11	bsu
Lead, total	M200.8 ICP-MS	1	0.001			mg/L	0.0001	0.0005	09/28/17 11:46	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 22:12	dcm
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/26/17 3:52	dcm
Magnesium, dissolved	M200.7 ICP	1	4.3			mg/L	0.2	1	09/25/17 22:12	dcm
Magnesium, total	M200.7 ICP	1	4.5			mg/L	0.2	1	09/26/17 3:52	dcm
Manganese, dissolved	M200.7 ICP	1	0.016	B		mg/L	0.005	0.03	09/25/17 22:12	dcm
Manganese, total	M200.7 ICP	1	0.045			mg/L	0.005	0.03	09/26/17 3:52	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:12	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:10	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/25/17 22:12	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/26/17 3:52	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 22:12	dcm
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/26/17 3:52	dcm
Potassium, dissolved	M200.7 ICP	1	4.5			mg/L	0.2	1	09/25/17 22:12	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-2

ACZ Sample ID: **L39772-02**  
Date Sampled: 09/04/17 12:00  
Date Received: 09/09/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	4.7		mg/L	0.2	1	09/26/17 3:52	dcm
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/25/17 22:12	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/26/17 3:52	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/26/17 14:11	bsu
Selenium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0003	09/28/17 11:46	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 14:11	bsu
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/28/17 11:46	msh
Sodium, dissolved	M200.7 ICP	1	10.2		mg/L	0.2	1	09/25/17 22:12	dcm
Sodium, total	M200.7 ICP	1	10.4		mg/L	0.2	1	09/26/17 3:52	dcm
Strontium, dissolved	M200.7 ICP	1	0.173		mg/L	0.005	0.03	09/25/17 22:12	dcm
Strontium, total	M200.7 ICP	1	0.174		mg/L	0.005	0.03	09/26/17 3:52	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:11	bsu
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/29/17 17:41	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/25/17 22:12	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/26/17 3:52	dcm
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/25/17 22:12	dcm
Titanium, total	M200.7 ICP	1	0.026	B	mg/L	0.005	0.03	09/26/17 3:52	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:11	bsu
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/28/17 11:46	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/25/17 22:12	dcm
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	09/26/17 3:52	dcm
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/25/17 22:12	dcm
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	09/26/17 3:52	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-2

ACZ Sample ID: **L39772-02**  
 Date Sampled: 09/04/17 12:00  
 Date Received: 09/09/17  
 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	64.1		*	mg/L	2	20	09/16/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Total Alkalinity		1	64.1		*	mg/L	2	20	09/16/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.0			%			10/05/17 0:00	calc
Sum of Anions			2.4			meq/L			10/05/17 0:00	calc
Sum of Cations			2.5			meq/L			10/05/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 12:41	emk
Chloride	SM4500Cl-E	1	10.4		*	mg/L	0.5	2	09/12/17 15:51	jmm
Conductivity @25C	SM2510B	1	264		*	umhos/cm	1	10	09/16/17 0:34	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:37	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:22	pjb
Fluoride	SM4500F-C	1	0.16	B	*	mg/L	0.05	0.3	09/14/17 16:00	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		99			mg/L	0.2	5	10/05/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	2	4.00		*	mg/L	0.04	0.2	09/15/17 23:21	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:59	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	09/22/17 22:50	pjb
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	09/16/17 0:00	emk
pH measured at		1	21.9		*	C	0.1	0.1	09/16/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	10/05/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	09/19/17 23:01	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	09/12/17 23:57	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	09/19/17 15:57	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	220		*	mg/L	10	20	09/11/17 14:09	che
Residue, Non-Filterable (TSS) @105C	SM2540D	1	9.0	B	*	mg/L	5	20	09/11/17 15:44	ecc
Residue, Total (TS) @ 105C	SM2540B	1	250		*	mg/L	10	20	09/11/17 16:25	che
Sulfate	D516-02/-07 - Turbidimetric	1	36.5		*	mg/L	1	5	09/12/17 11:39	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 14:07	emk
TDS (calculated)	Calculation		138			mg/L			10/05/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.59						10/05/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-2A

ACZ Sample ID: **L39772-03**  
Date Sampled: 09/04/17 11:20  
Date Received: 09/09/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 15:08	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/15/17 10:24	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/22/17 12:52	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:54	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:54	las
Total Hot Plate Digestion	M200.2 ICP								09/19/17 17:26	aeh
Total Hot Plate Digestion	M200.2 ICP-MS								09/22/17 10:14	mfm



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-2A

ACZ Sample ID: **L39772-03**

Date Sampled: 09/04/17 11:20

Date Received: 09/09/17

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.03	0.2	09/25/17 22:21	dcm
Aluminum, total	M200.7 ICP	1	0.15	B	*	mg/L	0.03	0.2	09/26/17 3:55	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0068			mg/L	0.0004	0.002	09/27/17 22:30	mfm
Antimony, total	M200.8 ICP-MS	1	0.0065			mg/L	0.0004	0.002	09/28/17 11:48	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0066			mg/L	0.0002	0.001	09/26/17 14:14	bsu
Arsenic, total	M200.8 ICP-MS	1	0.007			mg/L	0.0002	0.001	09/28/17 11:48	msh
Barium, dissolved	M200.7 ICP	1	0.065			mg/L	0.003	0.02	09/25/17 22:21	dcm
Barium, total	M200.7 ICP	1	0.065			mg/L	0.003	0.02	09/26/17 3:55	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:21	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:55	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/25/17 22:21	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/26/17 3:55	dcm
Boron, dissolved	M200.7 ICP	1	0.07			mg/L	0.01	0.05	09/25/17 22:21	dcm
Boron, total	M200.7 ICP	1	0.08			mg/L	0.01	0.05	09/26/17 3:55	dcm
Cadmium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	09/26/17 14:14	bsu
Cadmium, total	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	09/28/17 11:48	msh
Calcium, dissolved	M200.7 ICP	1	187			mg/L	0.1	0.5	09/25/17 22:21	dcm
Calcium, total	M200.7 ICP	1	217			mg/L	0.1	0.5	09/26/17 3:55	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:21	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:55	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:21	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:55	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:21	dcm
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:55	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/25/17 22:21	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/26/17 3:55	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/27/17 0:26	dcm
Iron, total	M200.7 ICP	1	0.10			mg/L	0.02	0.05	09/26/17 3:55	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	09/26/17 14:14	bsu
Lead, total	M200.8 ICP-MS	1	0.0051			mg/L	0.0001	0.0005	09/28/17 11:48	msh
Lithium, dissolved	M200.7 ICP	1	0.044			mg/L	0.008	0.04	09/25/17 22:21	dcm
Lithium, total	M200.7 ICP	1	0.044			mg/L	0.008	0.04	09/26/17 3:55	dcm
Magnesium, dissolved	M200.7 ICP	1	13.7			mg/L	0.2	1	09/25/17 22:21	dcm
Magnesium, total	M200.7 ICP	1	15.7			mg/L	0.2	1	09/26/17 3:55	dcm
Manganese, dissolved	M200.7 ICP	1	0.130			mg/L	0.005	0.03	09/25/17 22:21	dcm
Manganese, total	M200.7 ICP	1	0.171			mg/L	0.005	0.03	09/26/17 3:55	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:13	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:13	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/25/17 22:21	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/26/17 3:55	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 22:21	dcm
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/26/17 3:55	dcm
Potassium, dissolved	M200.7 ICP	1	7.1			mg/L	0.2	1	09/25/17 22:21	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-2A

ACZ Sample ID: **L39772-03**

Date Sampled: 09/04/17 11:20

Date Received: 09/09/17

Sample Matrix: *Surface Water*

Potassium, total	M200.7 ICP	1	7.6			mg/L	0.2	1	09/26/17 3:55	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/25/17 22:21	dcm
Scandium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/26/17 3:55	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0003	09/26/17 14:14	bsu
Selenium, total	M200.8 ICP-MS	1	0.0007			mg/L	0.0001	0.0003	09/28/17 11:48	msh
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/26/17 14:14	bsu
Silver, total	M200.8 ICP-MS	1	0.00011	B		mg/L	0.00005	0.0003	09/28/17 11:48	msh
Sodium, dissolved	M200.7 ICP	1	37.1			mg/L	0.2	1	09/25/17 22:21	dcm
Sodium, total	M200.7 ICP	1	42.3			mg/L	0.2	1	09/26/17 3:55	dcm
Strontium, dissolved	M200.7 ICP	1	2.09			mg/L	0.005	0.03	09/25/17 22:21	dcm
Strontium, total	M200.7 ICP	1	2.42			mg/L	0.005	0.03	09/26/17 3:55	dcm
Thallium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	09/26/17 14:14	bsu
Thallium, total	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	09/29/17 17:43	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/25/17 22:21	dcm
Tin, total	M200.7 ICP	1		U		mg/L	0.04	0.2	09/26/17 3:55	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/25/17 22:21	dcm
Titanium, total	M200.7 ICP	1		U		mg/L	0.005	0.03	09/26/17 3:55	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	09/26/17 14:14	bsu
Uranium, total	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	09/28/17 11:48	msh
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/25/17 22:21	dcm
Vanadium, total	M200.7 ICP	1		U		mg/L	0.005	0.03	09/26/17 3:55	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:21	dcm
Zinc, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:55	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-2A

ACZ Sample ID: **L39772-03**  
 Date Sampled: 09/04/17 11:20  
 Date Received: 09/09/17  
 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	70.3		*	mg/L	2	20	09/16/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Total Alkalinity		1	70.3		*	mg/L	2	20	09/16/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-4.0			%			10/05/17 0:00	calc
Sum of Anions			13			meq/L			10/05/17 0:00	calc
Sum of Cations			12			meq/L			10/05/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 12:49	emk
Chloride	SM4500Cl-E	1	34.3		*	mg/L	0.5	2	09/12/17 15:51	jmm
Conductivity @25C	SM2510B	1	1200		*	umhos/cm	1	10	09/16/17 0:43	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:38	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/15/17 22:03	pjb
Fluoride	SM4500F-C	1	0.65		*	mg/L	0.05	0.3	09/14/17 16:03	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		523			mg/L	0.2	5	10/05/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	1.64		*	mg/L	0.02	0.1	09/15/17 23:14	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 15:02	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	09/22/17 22:51	pjb
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	09/16/17 0:00	emk
pH measured at		1	22.0		*	C	0.1	0.1	09/16/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.06	B		mg/L	0.06	0.2	10/05/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	09/19/17 23:02	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/12/17 23:59	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	09/19/17 16:00	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	950		*	mg/L	10	20	09/11/17 14:10	che
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/11/17 15:50	ecc
Residue, Total (TS) @ 105C	SM2540B	1	984		*	mg/L	10	20	09/11/17 16:26	che
Sulfate	D516-02/-07 - Turbidimetric	20	479		*	mg/L	20	100	09/12/17 11:55	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 14:11	emk
TDS (calculated)	Calculation		804			mg/L			10/05/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.18						10/05/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-4

ACZ Sample ID: **L39772-04**  
 Date Sampled: 09/04/17 15:30  
 Date Received: 09/09/17  
 Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 15:22	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/15/17 10:36	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/22/17 13:13	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:58	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:58	las
Total Hot Plate Digestion	M200.2 ICP-MS								09/22/17 10:46	mfm
Total Hot Plate Digestion	M200.2 ICP								09/19/17 17:38	aeh



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-4

ACZ Sample ID: **L39772-04**  
Date Sampled: 09/04/17 15:30  
Date Received: 09/09/17  
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	09/25/17 22:24	dcm
Aluminum, total	M200.7 ICP	1	3.31		*	mg/L	0.03	0.2	09/26/17 3:58	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0028			mg/L	0.0004	0.002	09/27/17 22:39	mfm
Antimony, total	M200.8 ICP-MS	1	0.0024			mg/L	0.0004	0.002	09/28/17 11:58	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0061			mg/L	0.0002	0.001	09/26/17 14:17	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0076			mg/L	0.0002	0.001	09/28/17 11:58	msh
Barium, dissolved	M200.7 ICP	1	0.097			mg/L	0.003	0.02	09/25/17 22:24	dcm
Barium, total	M200.7 ICP	1	0.121			mg/L	0.003	0.02	09/26/17 3:58	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:24	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:58	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/25/17 22:24	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/26/17 3:58	dcm
Boron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	09/25/17 22:24	dcm
Boron, total	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	09/26/17 3:58	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:17	bsu
Cadmium, total	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	09/28/17 11:58	msh
Calcium, dissolved	M200.7 ICP	1	78.4			mg/L	0.1	0.5	09/25/17 22:24	dcm
Calcium, total	M200.7 ICP	1	81.8			mg/L	0.1	0.5	09/26/17 3:58	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:24	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:58	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:24	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:58	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 22:24	dcm
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 3:58	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/25/17 22:24	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/26/17 3:58	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/27/17 0:29	dcm
Iron, total	M200.7 ICP	1	1.59			mg/L	0.02	0.05	09/26/17 3:58	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:17	bsu
Lead, total	M200.8 ICP-MS	1	0.0028			mg/L	0.0001	0.0005	09/28/17 11:58	msh
Lithium, dissolved	M200.7 ICP	1	0.016	B		mg/L	0.008	0.04	09/25/17 22:24	dcm
Lithium, total	M200.7 ICP	1	0.013	B		mg/L	0.008	0.04	09/26/17 3:58	dcm
Magnesium, dissolved	M200.7 ICP	1	6.6			mg/L	0.2	1	09/25/17 22:24	dcm
Magnesium, total	M200.7 ICP	1	6.9			mg/L	0.2	1	09/26/17 3:58	dcm
Manganese, dissolved	M200.7 ICP	1	0.074			mg/L	0.005	0.03	09/25/17 22:24	dcm
Manganese, total	M200.7 ICP	1	0.155			mg/L	0.005	0.03	09/26/17 3:58	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/20/17 15:34	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:14	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/25/17 22:24	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/26/17 3:58	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 22:24	dcm
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/26/17 3:58	dcm
Potassium, dissolved	M200.7 ICP	1	5.3			mg/L	0.2	1	09/25/17 22:24	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-4

ACZ Sample ID: **L39772-04**  
Date Sampled: 09/04/17 15:30  
Date Received: 09/09/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	5.7		mg/L	0.2	1	09/26/17 3:58	dcm
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/25/17 22:24	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/26/17 3:58	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0003	09/26/17 14:17	bsu
Selenium, total	M200.8 ICP-MS	1	0.0003		mg/L	0.0001	0.0003	09/28/17 11:58	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 14:17	bsu
Silver, total	M200.8 ICP-MS	1	0.00005	B	mg/L	0.00005	0.0003	09/28/17 11:58	msh
Sodium, dissolved	M200.7 ICP	1	19.1		mg/L	0.2	1	09/25/17 22:24	dcm
Sodium, total	M200.7 ICP	1	19.5		mg/L	0.2	1	09/26/17 3:58	dcm
Strontium, dissolved	M200.7 ICP	1	0.747		mg/L	0.005	0.03	09/25/17 22:24	dcm
Strontium, total	M200.7 ICP	1	0.779		mg/L	0.005	0.03	09/26/17 3:58	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:17	bsu
Thallium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/29/17 17:49	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/25/17 22:24	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/26/17 3:58	dcm
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/25/17 22:24	dcm
Titanium, total	M200.7 ICP	1	0.084		mg/L	0.005	0.03	09/26/17 3:58	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/26/17 14:17	bsu
Uranium, total	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	09/28/17 11:58	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/25/17 22:24	dcm
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	09/26/17 3:58	dcm
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/25/17 22:24	dcm
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	09/26/17 3:58	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-4

ACZ Sample ID: **L39772-04**  
 Date Sampled: 09/04/17 15:30  
 Date Received: 09/09/17  
 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	68.4		*	mg/L	2	20	09/16/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/16/17 0:00	emk
Total Alkalinity		1	68.4		*	mg/L	2	20	09/16/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.8			%			10/05/17 0:00	calc
Sum of Anions			5.2			meq/L			10/05/17 0:00	calc
Sum of Cations			5.5			meq/L			10/05/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 12:56	emk
Chloride	SM4500Cl-E	1	15.7		*	mg/L	0.5	2	09/12/17 15:56	jmm
Conductivity @25C	SM2510B	1	570		*	umhos/cm	1	10	09/16/17 0:52	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:39	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/15/17 22:04	pjb
Fluoride	SM4500F-C	1	0.29	B	*	mg/L	0.05	0.3	09/14/17 16:06	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		223			mg/L	0.2	5	10/05/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.36		*	mg/L	0.02	0.1	09/15/17 23:15	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 15:03	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.4	B	*	mg/L	0.1	0.5	09/22/17 22:55	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	09/16/17 0:00	emk
pH measured at		1	21.8		*	C	0.1	0.1	09/16/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	10/05/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	09/19/17 23:03	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	09/13/17 0:01	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.08		*	mg/L	0.02	0.05	09/19/17 16:01	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	448		*	mg/L	10	20	09/11/17 14:12	che
Residue, Non-Filterable (TSS) @105C	SM2540D	1	56.0		*	mg/L	5	20	09/11/17 15:54	ecc
Residue, Total (TS) @ 105C	SM2540B	1	518		*	mg/L	10	20	09/11/17 16:28	che
Sulfate	D516-02/-07 - Turbidimetric	5	161		*	mg/L	5	25	09/12/17 11:55	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 14:22	emk
TDS (calculated)	Calculation		329			mg/L			10/05/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.36						10/05/17 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: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39772-01	WG432051	Aluminum, total	M200.7 ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG431364	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	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.
			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).
	WG431364	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431174	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).
	WG431078	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).
	WG431267	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).
	WG431364	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432253	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).
	WG431953	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG431364	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG431081	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).
	WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG430919	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG430945	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: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG431004	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG431023	Sulfide as S	SM4500S2-D	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).
			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).
	WG431364	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39772-02	WG432051	Aluminum, total	M200.7 ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG431364	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG431364	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431174	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).
	WG431078	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).
	WG431267	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).
	WG431364	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432253	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).
	WG431953	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG431364	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG431081	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).
	WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG430919	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG430945	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG431004	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG431023	Sulfide as S	SM4500S2-D	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

Tahoe Resources, Inc.

ACZ Project ID: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					item C5 of ACZ's Terms & Conditions).
			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).
	WG431364	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39772-03	WG432051	Aluminum, total	M200.7 ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG431364	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG431364	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431174	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).
	WG431388	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).
	WG431267	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).
	WG431364	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432253	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).
	WG431953	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG431364	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
	pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.	
WG431620	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).	
WG431081	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).	
WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	
WG430919	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.	
WG430945	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).	
WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.	
WG431004	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.	
WG431023	Sulfide as S	SM4500S2-D	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	

Tahoe Resources, Inc.

ACZ Project ID: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					item C5 of ACZ's Terms & Conditions).
			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).
	WG431364	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39772-04	WG432051	Aluminum, total	M200.7 ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG431364	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG431364	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431174	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).
	WG431388	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).
	WG431267	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).
	WG431364	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432253	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).
	WG431953	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			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).
	WG431364	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
WG431620	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).	
WG431081	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).	
WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.	
WG430919	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.	
WG430945	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).	
WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.	
WG431004	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.	

Tahoe Resources, Inc.

ACZ Project ID: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG431023	Sulfide as S	SM4500S2-D	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).
			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).
	WG431364	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-1

ACZ Sample ID: **L39772-01**  
Date Sampled: 09/04/17 14:20  
Date Received: 09/09/17  
Sample Matrix: Surface Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG431066**

Analyst: gss  
Extract Date: 09/11/17 21:00  
Analysis Date: 09/13/17 22:24

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.97	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	75.5		0.97	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-1

ACZ Sample ID: **L39772-01**

Date Sampled: 09/04/17 14:20

Date Received: 09/09/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431221

Analyst: jmm

Extract Date:

Analysis Date: 09/14/17 10:33

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.11	*	mg/L	2.2	11.1

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-2

ACZ Sample ID: **L39772-02**

Date Sampled: 09/04/17 12:00

Date Received: 09/09/17

Sample Matrix: Surface Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 21:37

Analysis Date: 09/13/17 22:47

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.98	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	76.8		0.98	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-2

ACZ Sample ID: **L39772-02**

Date Sampled: 09/04/17 12:00

Date Received: 09/09/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431221

Analyst: jmm

Extract Date:

Analysis Date: 09/14/17 10:36

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.11	*	mg/L	2.2	11.1



**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: SW-2AACZ Sample ID: **L39772-03**  
Date Sampled: 09/04/17 11:20  
Date Received: 09/09/17  
Sample Matrix: Surface Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG431066Analyst: gss  
Extract Date: 09/11/17 22:15  
Analysis Date: 09/13/17 23:10

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	77.2		0.93	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-2A

ACZ Sample ID: **L39772-03**

Date Sampled: 09/04/17 11:20

Date Received: 09/09/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431221

Analyst: jmm

Extract Date:

Analysis Date: 09/14/17 10:39

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.09	*	mg/L	2.2	10.9

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-4

ACZ Sample ID: **L39772-04**

Date Sampled: 09/04/17 15:30

Date Received: 09/09/17

Sample Matrix: *Surface Water***Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 22:52

Analysis Date: 09/13/17 23:34

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.97	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	76.1		0.97	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-4

ACZ Sample ID: **L39772-04**

Date Sampled: 09/04/17 15:30

Date Received: 09/09/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431221

Analyst: jmm

Extract Date:

Analysis Date: 09/14/17 10:42

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



**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: **L39772**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L39772-01</b>	WG431066	*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.
	WG431221	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
<b>L39772-02</b>	WG431066	*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.
	WG431221	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
<b>L39772-03</b>	WG431066	*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.
	WG431221	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.
<b>L39772-04</b>	WG431066	*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.
	WG431221	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
			1664A - Gravimetric	Q9	Insufficient sample received to meet method QC requirements.

**Tahoe Resources, Inc.**

ACZ Project ID: **L39772**

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: L39772  
 Date Received: 09/09/2017 11:14  
 Received By:  
 Date Printed: 9/11/2017

**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 Sample I.D. Line 1-2 (COC 2) 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? <sup>1</sup>	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	

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
5141	10.5	<=6.0	15	N/A
5229	18.3	<=6.0	15	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.



**Tahoe Resources, Inc.**  
Escobal

ACZ Project ID: L39772  
Date Received: 09/09/2017 11:14  
Received By:  
Date Printed: 9/11/2017

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

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

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

COPY 39772

CHAIN of CUSTODY

Report to:

Name: Luisa fernanda Barrios
Company: Minera San Rafael
E-mail: LBarrios@sanrafael.com.gt

Address: Blvd. los Picones (Calle 24-69 210
Empresarial 2 Picones Torre W oficina 1401
Telephone: (502) 5696 4268

Copy of Report to:

Name: Evon Quednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: fsamayoa@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa fernanda Barrios
Company:
E-mail:

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: EVQ 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 large 'COPY' watermark.

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

REMARKS

COE# 1/p: Please include the samples marked with an asterisk (\*) in all six COE in the same project 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 05-07-2017 and 10:15.



Laboratories, Inc. 039772

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrios
Company: Minera San Rafael
E-mail: L.Barrios@sanrafael.com.gt

Address: Blvd Los Proceres 18 calle 24-69 Z 10
Empresarial, Zócalo, Torre IV oficina 1406
Telephone: (502) 5696 4768

Copy of Report to:

Name: Lion Quednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: Fbarron@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: 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 10 analysis columns. Includes handwritten entries for Pileta 3, EP-10, and SW-4.

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

REMARKS

COC 3/6
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 for June Aguilera and another person.

September 29, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39757

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 08, 2017. This project has been assigned to ACZ's project number, L39757. 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 L39757. 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 October 29, 2017. 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.

September 29, 2017

Project ID: Escobal

ACZ Project ID: L39757

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 2 miscellaneous samples from Tahoe Resources, Inc. on September 8, 2017. 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 L39757. 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, 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: SW-3

ACZ Sample ID: **L39757-02**  
Date Sampled: 09/04/17 14:55  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/11/17 14:09	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 15:48	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 15:02	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:16	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/13/17 17:40	wtc
Total Hot Plate Digestion	M200.2 ICP								09/15/17 15:30	aeH
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 20:03	mfm

**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: **L39757**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39757-02	WG431783	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431912	Cadmium, dissolved	M200.8 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.
	WG431050	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	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.
			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).
	WG431050	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).
	WG431070	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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431783	Iron, total	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.
	WG431389	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).
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG430866	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	H3	Sample was received and analyzed past holding time.

Tahoe Resources, Inc.

ACZ Project ID: **L39757**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			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).
WG431341		Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
WG430871		Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			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).
WG430882		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).
WG430949		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG430978		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.
WG431023		Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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	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).
WG431050		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: SW-3ACZ Sample ID: **L39757-02**  
Date Sampled: 09/04/17 14:55  
Date Received: 09/08/17  
Sample Matrix: Surface Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG431066Analyst: gss  
Extract Date: 09/11/17 16:37  
Analysis Date: 09/13/17 19:17

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	74.8		1	*	%	60	120



**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-3

ACZ Sample ID: **L39757-02**

Date Sampled: 09/04/17 14:55

Date Received: 09/08/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:16

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.11	*	mg/L	2.2	11.1

**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: **L39757**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L39757-01</b>	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
<b>L39757-02</b>	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39757**

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: L39757  
 Date Received: 09/08/2017 10:17  
 Received By:  
 Date Printed: 9/8/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
5150	15.1	<=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: L39757  
Date Received: 09/08/2017 10:17  
Received By:  
Date Printed: 9/8/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



# Laboratories, Inc.

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

L39757

## CHAIN of CUSTODY

### Report to:

Name: <u>Luisa Fernanda Barrios</u>	Address: <u>Rvd Los Pinos 5, 18 calle 24-69 Z 10</u>
Company: <u>Minera San Rafael</u>	<u>Empresarial, 2 Pradera Torre IV oficina 1406</u>
E-mail: <u>LBarrios@sanrafael.com.gt</u>	Telephone: <u>(502) 5696-4268</u>

### Copy of Report to:

Name: <u>Evonquednow@sanrafael.com.gt</u>	E-mail: <u>fsamayo@sanrafael.com.gt</u>
Company: <u>Minera San Rafael</u>	Telephone: <u></u>

### Invoice to:

Name: <u>Luisa Fernanda Barrios</u>	Address: <u></u>
Company: <u></u>	<u></u>
E-mail: <u></u>	Telephone: <u></u>

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: EVR 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)

SAMPLE IDENTIFICATION				DATE:TIME	Matrix	# of Containers	SW	Total CW						
1. *	SW-2B	04/09/17	10:40	SW	10	/								
2. *	SW-3	04/09/17	13:55	SW	10	/								
	SW-3B	04/09/17	12:25	SW	10	/								
	POZO PP	01/09/17	08:55	GW	1			/						
	WU1-9	01/09/17	07:43	WW	1			/						
	pileta de proceso	01/09/17	09:05	WW	1			/						

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

### REMARKS

COC 2/6 : Please include SW-3B sample and SW-13 sample (in COC # 6/6) in a separate 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>JUAN AGUIRRE</u>	<u>05-09-2017</u>	<u>[Signature]</u>	<u>10:15</u>
	<u>10:15</u>	<u>[Signature]</u>	<u>5/11/17</u>
		<u>[Signature]</u>	<u>9/8/17, 10/17</u>

L39757 Chain of Custody



Guatemala, September 4th, 2017

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).

Best regards,

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

October 04, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39755

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 08, 2017. This project has been assigned to ACZ's project number, L39755. 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 L39755. 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 November 03, 2017. 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.

October 04, 2017

Project ID: Escobal

ACZ Project ID: L39755

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 3 miscellaneous samples from Tahoe Resources, Inc. on September 8, 2017. 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 L39755. 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, 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. TDS (N1) - The oven was out of specifications on 9/11/17. It was within range when workgroup was removed.
3. Diesel Range Organics for sample L39755-01 - We were unable to report the DRO analysis for this sample. The glass bottom of the extraction vessel broke out and all of the sample was lost. There was no additional sample remaining for re-extraction.



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-4A

ACZ Sample ID: **L39755-01**  
Date Sampled: 09/04/17 10:10  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/11/17 13:18	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 15:19	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 14:04	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:08	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/13/17 17:21	wtc
Total Hot Plate Digestion	M200.2 ICP								09/15/17 14:18	aeh
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 19:20	mfm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-4A

ACZ Sample ID: **L39755-01**

Date Sampled: 09/04/17 10:10

Date Received: 09/08/17

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	09/23/17 5:20	dcm
Aluminum, total	M200.7 ICP	1	4.10		*	mg/L	0.03	0.2	09/22/17 0:29	aeh
Antimony, dissolved	M200.8 ICP-MS	1	0.0018	B		mg/L	0.0004	0.002	09/26/17 0:29	bsu
Antimony, total	M200.8 ICP-MS	1	0.0014	B		mg/L	0.0004	0.002	09/27/17 10:24	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.006			mg/L	0.0002	0.001	09/26/17 0:29	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0082			mg/L	0.0002	0.001	09/27/17 10:24	msh
Barium, dissolved	M200.7 ICP	1	0.098			mg/L	0.003	0.02	09/23/17 5:20	dcm
Barium, total	M200.7 ICP	1	0.129			mg/L	0.003	0.02	09/20/17 21:40	aeh
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:20	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:40	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 5:20	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/20/17 21:40	aeh
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/23/17 5:20	dcm
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:40	aeh
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 0:29	bsu
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/27/17 10:24	msh
Calcium, dissolved	M200.7 ICP	1	56.7			mg/L	0.1	0.5	09/23/17 5:20	dcm
Calcium, total	M200.7 ICP	1	49.9			mg/L	0.1	0.5	09/20/17 21:40	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:20	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:40	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:20	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:40	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:20	dcm
Copper, total	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	09/20/17 21:40	aeh
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 5:20	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/20/17 21:40	aeh
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/23/17 5:20	dcm
Iron, total	M200.7 ICP	1	2.12		*	mg/L	0.02	0.05	09/22/17 0:29	aeh
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 0:29	bsu
Lead, total	M200.8 ICP-MS	1	0.0028			mg/L	0.0001	0.0005	09/27/17 10:24	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 5:20	dcm
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/20/17 21:40	aeh
Magnesium, dissolved	M200.7 ICP	1	5.4			mg/L	0.2	1	09/23/17 5:20	dcm
Magnesium, total	M200.7 ICP	1	4.8			mg/L	0.2	1	09/20/17 21:40	aeh
Manganese, dissolved	M200.7 ICP	1	0.074			mg/L	0.005	0.03	09/23/17 5:20	dcm
Manganese, total	M200.7 ICP	1	0.148			mg/L	0.005	0.03	09/20/17 21:40	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:57	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 16:49	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 5:20	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/20/17 21:40	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 12:25	dcm
Nickel, total	M200.7 ICP	1	0.015	B		mg/L	0.008	0.04	09/20/17 21:40	aeh
Potassium, dissolved	M200.7 ICP	1	5.0			mg/L	0.2	1	09/23/17 5:20	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-4A

ACZ Sample ID: **L39755-01**  
Date Sampled: 09/04/17 10:10  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	5.2		mg/L	0.2	1	09/20/17 21:40	aeh
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/23/17 5:20	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/20/17 21:40	aeh
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/26/17 0:29	bsu
Selenium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0003	09/27/17 10:24	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 13:29	bsu
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/27/17 10:24	msh
Sodium, dissolved	M200.7 ICP	1	15.7		mg/L	0.2	1	09/23/17 5:20	dcm
Sodium, total	M200.7 ICP	1	14.2		mg/L	0.2	1	09/20/17 21:40	aeh
Strontium, dissolved	M200.7 ICP	1	0.455		mg/L	0.005	0.03	09/23/17 5:20	dcm
Strontium, total	M200.7 ICP	1	0.388		mg/L	0.005	0.03	09/20/17 21:40	aeh
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 0:29	bsu
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/28/17 14:58	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 5:20	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/20/17 21:40	aeh
Titanium, dissolved	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	09/23/17 5:20	dcm
Titanium, total	M200.7 ICP	1	0.102		mg/L	0.005	0.03	09/20/17 21:40	aeh
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/26/17 0:29	bsu
Uranium, total	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	09/27/17 10:24	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 5:20	dcm
Vanadium, total	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	09/20/17 21:40	aeh
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 5:20	dcm
Zinc, total	M200.7 ICP	1	0.09		mg/L	0.01	0.05	09/20/17 21:40	aeh

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-4A

ACZ Sample ID: **L39755-01**  
Date Sampled: 09/04/17 10:10  
Date Received: 09/08/17  
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	68.3		*	mg/L	2	20	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1	68.3		*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.5			%			10/04/17 0:00	calc
Sum of Anions			3.9			meq/L			10/04/17 0:00	calc
Sum of Cations			4.1			meq/L			10/04/17 0:00	calc
Chemical Oxygen Demand	M410.4	1	18	B	*	mg/L	10	20	09/15/17 10:23	emk
Chloride	SM4500Cl-E	1	12.2		*	mg/L	0.5	2	09/12/17 15:40	jmm
Conductivity @25C	SM2510B	1	376		*	umhos/cm	1	10	09/13/17 2:14	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 16:56	las
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:09	pjb
Fluoride	SM4500F-C	1	0.19	B	*	mg/L	0.05	0.3	09/13/17 17:11	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		164			mg/L	0.2	5	10/04/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.57		*	mg/L	0.02	0.1	09/15/17 22:47	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/20/17 16:26	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.3	B	*	mg/L	0.1	0.5	09/16/17 15:25	pjb
pH (lab)	SM4500H+ B									
pH		1	8.2	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	21.7		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	10/04/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	09/19/17 22:47	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	09/08/17 22:32	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.07		*	mg/L	0.02	0.05	09/21/17 0:27	pjb
Residue, Filterable (TDS) @180C	SM2540C	2	328		*	mg/L	20	40	09/09/17 11:28	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	54.0		*	mg/L	5	20	09/11/17 9:48	ecc
Residue, Total (TS) @ 105C	SM2540B	1	380		*	mg/L	10	20	09/11/17 16:04	che
Sulfate	D516-02/-07 - Turbidimetric	5	106		*	mg/L	5	25	09/12/17 10:51	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 13:07	emk
TDS (calculated)	Calculation		243			mg/L			10/04/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.35						10/04/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-7

ACZ Sample ID: **L39755-02**  
Date Sampled: 09/04/17 08:25  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/11/17 13:25	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 15:26	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 14:14	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/11/17 14:27	krh
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/13/17 17:26	wtc
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 19:31	mfm
Total Hot Plate Digestion	M200.2 ICP								09/15/17 14:54	aeh



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-7

ACZ Sample ID: **L39755-02**  
Date Sampled: 09/04/17 08:25  
Date Received: 09/08/17  
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	09/23/17 5:23	dcm
Aluminum, total	M200.7 ICP	1	3.35		*	mg/L	0.03	0.2	09/22/17 0:45	aeh
Antimony, dissolved	M200.8 ICP-MS	1	0.0006	B		mg/L	0.0004	0.002	09/26/17 0:38	bsu
Antimony, total	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	09/27/17 10:26	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0023			mg/L	0.0002	0.001	09/26/17 0:38	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0032			mg/L	0.0002	0.001	09/27/17 10:26	msh
Barium, dissolved	M200.7 ICP	1	0.072			mg/L	0.003	0.02	09/23/17 5:23	dcm
Barium, total	M200.7 ICP	1	0.096			mg/L	0.003	0.02	09/20/17 21:56	aeh
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:23	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:56	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 5:23	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/20/17 21:56	aeh
Boron, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/23/17 5:23	dcm
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:56	aeh
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 0:38	bsu
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/27/17 10:26	msh
Calcium, dissolved	M200.7 ICP	1	14.4			mg/L	0.1	0.5	09/23/17 5:23	dcm
Calcium, total	M200.7 ICP	1	14.2			mg/L	0.1	0.5	09/20/17 21:56	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:23	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:56	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:23	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 21:56	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:23	dcm
Copper, total	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	09/20/17 21:56	aeh
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 5:23	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/20/17 21:56	aeh
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/23/17 5:23	dcm
Iron, total	M200.7 ICP	1	1.41		*	mg/L	0.02	0.05	09/22/17 0:45	aeh
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 0:38	bsu
Lead, total	M200.8 ICP-MS	1	0.0012			mg/L	0.0001	0.0005	09/27/17 10:26	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 5:23	dcm
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/20/17 21:56	aeh
Magnesium, dissolved	M200.7 ICP	1	2.7			mg/L	0.2	1	09/23/17 5:23	dcm
Magnesium, total	M200.7 ICP	1	2.8			mg/L	0.2	1	09/20/17 21:56	aeh
Manganese, dissolved	M200.7 ICP	1	0.010	B		mg/L	0.005	0.03	09/23/17 5:23	dcm
Manganese, total	M200.7 ICP	1	0.044			mg/L	0.005	0.03	09/20/17 21:56	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:58	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 16:50	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 5:23	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/20/17 21:56	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 12:33	dcm
Nickel, total	M200.7 ICP	1	0.014	B		mg/L	0.008	0.04	09/20/17 21:56	aeh
Potassium, dissolved	M200.7 ICP	1	3.5			mg/L	0.2	1	09/23/17 5:23	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-7

ACZ Sample ID: **L39755-02**  
Date Sampled: 09/04/17 08:25  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	3.8		mg/L	0.2	1	09/20/17 21:56	aeH
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/23/17 5:23	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/20/17 21:56	aeH
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/26/17 0:38	bsu
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/27/17 10:26	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 13:33	bsu
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/27/17 10:26	msh
Sodium, dissolved	M200.7 ICP	1	8.5		mg/L	0.2	1	09/23/17 5:23	dcm
Sodium, total	M200.7 ICP	1	8.2		mg/L	0.2	1	09/20/17 21:56	aeH
Strontium, dissolved	M200.7 ICP	1	0.104		mg/L	0.005	0.03	09/23/17 5:23	dcm
Strontium, total	M200.7 ICP	1	0.098		mg/L	0.005	0.03	09/20/17 21:56	aeH
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 0:38	bsu
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/28/17 15:01	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 5:23	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/20/17 21:56	aeH
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 5:23	dcm
Titanium, total	M200.7 ICP	1	0.083		mg/L	0.005	0.03	09/20/17 21:56	aeH
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 0:38	bsu
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/27/17 10:26	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 5:23	dcm
Vanadium, total	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	09/20/17 21:56	aeH
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 5:23	dcm
Zinc, total	M200.7 ICP	1	0.08		mg/L	0.01	0.05	09/20/17 21:56	aeH

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-7

ACZ Sample ID: **L39755-02**  
Date Sampled: 09/04/17 08:25  
Date Received: 09/08/17  
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	40.3		*	mg/L	2	20	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1	40.3		*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			7.7			%			10/04/17 0:00	calc
Sum of Anions			1.2			meq/L			10/04/17 0:00	calc
Sum of Cations			1.4			meq/L			10/04/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 10:31	emk
Chloride	SM4500Cl-E	1	5.9		*	mg/L	0.5	2	09/12/17 15:40	jmm
Conductivity @25C	SM2510B	1	148		*	umhos/cm	1	10	09/13/17 2:57	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 16:57	las
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:10	pjb
Fluoride	SM4500F-C	1	0.10	B	*	mg/L	0.05	0.3	09/13/17 17:26	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		47			mg/L	0.2	5	10/04/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.61		*	mg/L	0.02	0.1	09/15/17 22:48	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/14/17 16:46	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	09/16/17 15:26	pjb
pH (lab)	SM4500H+ B									
pH		1	7.8	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	22.4		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	10/04/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	09/11/17 17:00	wc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	09/08/17 22:33	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	09/21/17 0:15	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	188		*	mg/L	10	20	09/09/17 11:34	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	26.0		*	mg/L	5	20	09/11/17 9:54	ecc
Residue, Total (TS) @ 105C	SM2540B	1	200		*	mg/L	10	20	09/11/17 16:06	che
Sulfate	D516-02/-07 - Turbidimetric	1	12.1		*	mg/L	1	5	09/12/17 10:58	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 13:11	emk
TDS (calculated)	Calculation		71.9			mg/L			10/04/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		2.61						10/04/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-6

ACZ Sample ID: **L39755-03**  
Date Sampled: 09/04/17 09:20  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/11/17 13:33	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 15:33	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 14:33	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/11/17 14:38	krh
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/13/17 17:31	wtc
Total Hot Plate Digestion	M200.2 ICP								09/15/17 15:06	aeh
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 19:42	mfm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-6

ACZ Sample ID: **L39755-03**  
 Date Sampled: 09/04/17 09:20  
 Date Received: 09/08/17  
 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	09/23/17 5:38	dcm
Aluminum, total	M200.7 ICP	1	3.37		*	mg/L	0.03	0.2	09/22/17 0:48	aeh
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/26/17 0:41	bsu
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/27/17 10:28	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0008	B		mg/L	0.0002	0.001	09/26/17 0:41	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0019			mg/L	0.0002	0.001	09/27/17 10:28	msh
Barium, dissolved	M200.7 ICP	1	0.036			mg/L	0.003	0.02	09/23/17 5:38	dcm
Barium, total	M200.7 ICP	1	0.066			mg/L	0.003	0.02	09/20/17 22:00	aeh
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:38	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 22:00	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 5:38	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/20/17 22:00	aeh
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/23/17 5:38	dcm
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 22:00	aeh
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 0:41	bsu
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/27/17 10:28	msh
Calcium, dissolved	M200.7 ICP	1	6.2			mg/L	0.1	0.5	09/23/17 5:38	dcm
Calcium, total	M200.7 ICP	1	6.4			mg/L	0.1	0.5	09/20/17 22:00	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:38	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 22:00	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:38	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/20/17 22:00	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:38	dcm
Copper, total	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	09/20/17 22:00	aeh
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 5:38	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/20/17 22:00	aeh
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/23/17 5:38	dcm
Iron, total	M200.7 ICP	1	1.75		*	mg/L	0.02	0.05	09/22/17 0:48	aeh
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 0:41	bsu
Lead, total	M200.8 ICP-MS	1	0.0011			mg/L	0.0001	0.0005	09/27/17 10:28	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 5:38	dcm
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/20/17 22:00	aeh
Magnesium, dissolved	M200.7 ICP	1	1.6			mg/L	0.2	1	09/23/17 5:38	dcm
Magnesium, total	M200.7 ICP	1	1.6			mg/L	0.2	1	09/20/17 22:00	aeh
Manganese, dissolved	M200.7 ICP	1	0.010	B		mg/L	0.005	0.03	09/23/17 5:38	dcm
Manganese, total	M200.7 ICP	1	0.072			mg/L	0.005	0.03	09/20/17 22:00	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:59	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 16:51	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 5:38	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/20/17 22:00	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 12:36	dcm
Nickel, total	M200.7 ICP	1	0.016	B		mg/L	0.008	0.04	09/20/17 22:00	aeh
Potassium, dissolved	M200.7 ICP	1	2.8			mg/L	0.2	1	09/23/17 5:38	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-6

ACZ Sample ID: **L39755-03**  
Date Sampled: 09/04/17 09:20  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	3.1		mg/L	0.2	1	09/20/17 22:00	aeh
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/23/17 5:38	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/20/17 22:00	aeh
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/26/17 0:41	bsu
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/27/17 10:28	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 13:39	bsu
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/27/17 10:28	msh
Sodium, dissolved	M200.7 ICP	1	5.5		mg/L	0.2	1	09/23/17 5:38	dcm
Sodium, total	M200.7 ICP	1	5.4		mg/L	0.2	1	09/20/17 22:00	aeh
Strontium, dissolved	M200.7 ICP	1	0.051		mg/L	0.005	0.03	09/23/17 5:38	dcm
Strontium, total	M200.7 ICP	1	0.050		mg/L	0.005	0.03	09/20/17 22:00	aeh
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 0:41	bsu
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/28/17 15:03	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 5:38	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/20/17 22:00	aeh
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 5:38	dcm
Titanium, total	M200.7 ICP	1	0.092		mg/L	0.005	0.03	09/20/17 22:00	aeh
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 0:41	bsu
Uranium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/27/17 10:28	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 5:38	dcm
Vanadium, total	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	09/20/17 22:00	aeh
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 5:38	dcm
Zinc, total	M200.7 ICP	1	0.07		mg/L	0.01	0.05	09/20/17 22:00	aeh

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-6

ACZ Sample ID: **L39755-03**  
Date Sampled: 09/04/17 09:20  
Date Received: 09/08/17  
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	22.8		*	mg/L	2	20	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1	22.8		*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			3.1			%			10/04/17 0:00	calc
Sum of Anions			0.712			meq/L			10/04/17 0:00	calc
Sum of Cations			0.758			meq/L			10/04/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 10:39	emk
Chloride	SM4500Cl-E	1	4.9		*	mg/L	0.5	2	09/12/17 15:40	jmm
Conductivity @25C	SM2510B	1	81.8		*	umhos/cm	1	10	09/13/17 3:03	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 16:58	las
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:11	pjb
Fluoride	SM4500F-C	1	0.07	B	*	mg/L	0.05	0.3	09/13/17 17:37	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		22			mg/L	0.2	5	10/04/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	1.17		*	mg/L	0.02	0.1	09/15/17 22:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/14/17 16:47	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.2	B	*	mg/L	0.1	0.5	09/16/17 15:28	pjb
pH (lab)	SM4500H+ B									
pH		1	7.6	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	22.1		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/04/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/11/17 17:01	wc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/08/17 22:36	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	09/21/17 0:16	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	108		*	mg/L	10	20	09/09/17 11:36	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	36.0		*	mg/L	5	20	09/11/17 9:56	ecc
Residue, Total (TS) @ 105C	SM2540B	1	144		*	mg/L	10	20	09/11/17 16:07	che
Sulfate	D516-02/-07 - Turbidimetric	1	5.5		*	mg/L	1	5	09/12/17 10:58	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 13:15	emk
TDS (calculated)	Calculation		40.5			mg/L			10/04/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		2.67						10/04/17 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: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39755-01	WG431783	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431050	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431070	Cyanide, total	M335.4 - Colorimetric w/ distillation	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431783	Iron, total	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.
	WG431389	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).
	WG431657	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG431394	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	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.
			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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG430866	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).
	WG431720	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.

Tahoe Resources, Inc.

ACZ Project ID: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			SM2540C	Q6	Sample was received above recommended temperature.
WG430882		Residue, Non-Filterable (TSS) @105C	SM2540D	Q6	Sample was received above recommended temperature.
WG430949		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG430978		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.
WG431023		Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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	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).
WG431050		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39755-02	WG431783	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431050	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).
	WG431070	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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431783	Iron, total	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.
	WG431389	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).
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG430963	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).
	WG430866	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).
	WG431720	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.

Tahoe Resources, Inc.

ACZ Project ID: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			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).
	WG430882	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG430978	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.
	WG431023	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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	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).
	WG431050	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.

ACZ Project ID: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39755-03	WG431783	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	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).
	WG431050	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).
	WG431070	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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431783	Iron, total	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.
	WG431389	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).
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG430963	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).
	WG430866	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: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG431720	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			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).
	WG430882	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG430978	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.
	WG431023	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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	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).
	WG431050	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: SW-4AACZ Sample ID: **L39755-01**  
Date Sampled: 09/04/17 10:10  
Date Received: 09/08/17  
Sample Matrix: Surface Water**Oil & Grease, Total Recoverable**Analysis Method: **1664A - Gravimetric**  
Extract Method:**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:05

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.11	*	mg/L	2.2	11.1



**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-7

ACZ Sample ID: **L39755-02**

Date Sampled: 09/04/17 8:25

Date Received: 09/08/17

Sample Matrix: Surface Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 14:45

Analysis Date: 09/13/17 18:07

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	79.2		1	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-7

ACZ Sample ID: **L39755-02**

Date Sampled: 09/04/17 8:25

Date Received: 09/08/17

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:08

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.11	*	mg/L	2.2	11.1

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-6

ACZ Sample ID: **L39755-03**

Date Sampled: 09/04/17 9:20

Date Received: 09/08/17

Sample Matrix: *Surface Water***Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 15:22

Analysis Date: 09/13/17 18:30

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.97	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	80.4		0.97	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-6

ACZ Sample ID: **L39755-03**

Date Sampled: 09/04/17 9:20

Date Received: 09/08/17

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:11

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.08	*	mg/L	2.2	10.8

**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: **L39755**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39755-01	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L39755-02	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
L39755-03	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

**Tahoe Resources, Inc.**

ACZ Project ID: **L39755**

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: L39755  
 Date Received: 09/08/2017 11:14  
 Received By:  
 Date Printed: 9/8/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
5151	14.5	<=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: L39755  
Date Received: 09/08/2017 11:14  
Received By:  
Date Printed: 9/8/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

L39755

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrios
Company: Minera San Rafael
E-mail: LBarrios@sanrafael.com.gt

Address: Blvd. los Proceres 18 calle 24-69210
Empresarial 2 Proceres Torre W oficina 1406
Telephone: (502) 5696 4268

Copy of Report to:

Name: Evon Quednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: samayor@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: EVQ 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. Includes handwritten entries for SW-4A, SW-7, SW-6, Pileta 3, POZO PP, Pileta de proceso.

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

REMARKS

COC 4/6

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.

L39755 Chain of Custody





Guatemala, September 4th, 2017

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).

Best regards,

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

October 31, 2017

## Report to:

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

## Bill to:

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

cc: Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L40390

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 07, 2017. This project has been assigned to ACZ's project number, L40390. 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 L40390. 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 November 30, 2017. 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.

October 31, 2017

Project ID: Escobal

ACZ Project ID: L40390

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 1 miscellaneous sample from Tahoe Resources, Inc. on October 7, 2017. The sample was received in good condition. Upon receipt, the sample custodian removed the sample from the cooler, inspected the contents, and logged the sample into ACZ's computerized Laboratory Information Management System (LIMS). The sample was assigned ACZ LIMS project number L40390. 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**

This sample was analyzed for inorganic, organic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports.

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-5

ACZ Sample ID: **L40390-01**

Date Sampled: 09/28/17 10:42

Date Received: 10/07/17

Sample Matrix: Surface Water

## Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/10/17 13:58	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/09/17 13:44	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								10/18/17 15:37	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/19/17 16:48	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/17/17 16:40	wtc
Total Hot Plate Digestion	M200.2 ICP								10/19/17 10:48	aeH
Total Hot Plate Digestion	M200.2 ICP-MS								10/19/17 19:09	mfm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-5

ACZ Sample ID: **L40390-01**

Date Sampled: 09/28/17 10:42

Date Received: 10/07/17

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	10/13/17 17:40	dcm
Aluminum, total	M200.7 ICP	1	2.47			mg/L	0.03	0.2	10/19/17 19:28	aeh
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/24/17 18:45	msh
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/23/17 19:23	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0002	0.001	10/24/17 18:45	msh
Arsenic, total	M200.8 ICP-MS	1	0.0014			mg/L	0.0002	0.001	10/23/17 19:23	mfm
Barium, dissolved	M200.7 ICP	1	0.025			mg/L	0.003	0.02	10/13/17 17:40	dcm
Barium, total	M200.7 ICP	1	0.045			mg/L	0.003	0.02	10/18/17 11:04	aeh
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/13/17 17:40	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	10/17/17 15:41	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/13/17 17:40	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/17/17 15:41	dcm
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/13/17 17:40	dcm
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	10/17/17 15:41	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/24/17 18:45	msh
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/23/17 19:23	mfm
Calcium, dissolved	M200.7 ICP	1	3.4			mg/L	0.1	0.5	10/13/17 17:40	dcm
Calcium, total	M200.7 ICP	1	3.4			mg/L	0.1	0.5	10/17/17 15:41	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/13/17 17:40	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	10/17/17 15:41	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/13/17 17:40	dcm
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	10/17/17 15:41	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/13/17 17:40	dcm
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	10/17/17 15:41	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/16/17 14:48	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/17/17 15:41	dcm
Iron, dissolved	M200.7 ICP	1	0.06		*	mg/L	0.02	0.05	10/13/17 17:40	dcm
Iron, total	M200.7 ICP	1	0.94			mg/L	0.02	0.05	10/17/17 15:41	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	10/24/17 18:45	msh
Lead, total	M200.8 ICP-MS	1	0.0008			mg/L	0.0001	0.0005	10/23/17 19:23	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/13/17 17:40	dcm
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	10/17/17 15:41	dcm
Magnesium, dissolved	M200.7 ICP	1	0.8	B		mg/L	0.2	1	10/13/17 17:40	dcm
Magnesium, total	M200.7 ICP	1	0.9	B		mg/L	0.2	1	10/17/17 15:41	dcm
Manganese, dissolved	M200.7 ICP	1	0.011	B		mg/L	0.005	0.03	10/13/17 17:40	dcm
Manganese, total	M200.7 ICP	1	0.031			mg/L	0.005	0.03	10/17/17 15:41	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/17/17 19:01	sck
Mercury, total	M245.1 CVAA	1		U	*	mg/L	0.0002	0.001	10/17/17 16:35	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/13/17 17:40	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	10/17/17 15:41	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/13/17 17:40	dcm
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	10/17/17 15:41	dcm
Potassium, dissolved	M200.7 ICP	1	1.9			mg/L	0.2	1	10/13/17 17:40	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-5

ACZ Sample ID: **L40390-01**  
Date Sampled: 09/28/17 10:42  
Date Received: 10/07/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	2.3		mg/L	0.2	1	10/17/17 15:41	dcm
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	10/13/17 17:40	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	10/17/17 15:41	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	10/24/17 18:45	msh
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	10/23/17 19:23	mfm
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	10/24/17 18:45	msh
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	10/23/17 19:23	mfm
Sodium, dissolved	M200.7 ICP	1	3.3		mg/L	0.2	1	10/13/17 17:40	dcm
Sodium, total	M200.7 ICP	1	3.3		mg/L	0.2	1	10/17/17 15:41	dcm
Strontium, dissolved	M200.7 ICP	1	0.031		mg/L	0.005	0.03	10/13/17 17:40	dcm
Strontium, total	M200.7 ICP	1	0.034		mg/L	0.005	0.03	10/17/17 15:41	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	10/24/17 18:45	msh
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	10/23/17 19:23	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	10/13/17 17:40	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	10/17/17 15:41	dcm
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	10/13/17 17:40	dcm
Titanium, total	M200.7 ICP	1	0.049		mg/L	0.005	0.03	10/17/17 15:41	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	10/24/17 18:45	msh
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	10/23/17 19:23	mfm
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	10/13/17 17:40	dcm
Vanadium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	10/17/17 15:41	dcm
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	10/13/17 17:40	dcm
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	10/17/17 15:41	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-5

ACZ Sample ID: **L40390-01**  
 Date Sampled: 09/28/17 10:42  
 Date Received: 10/07/17  
 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	11.6	BH	*	mg/L	2	20	10/16/17 0:00	enb
Carbonate as CaCO3		1		UH	*	mg/L	2	20	10/16/17 0:00	enb
Hydroxide as CaCO3		1		UH	*	mg/L	2	20	10/16/17 0:00	enb
Total Alkalinity		1	11.6	BH	*	mg/L	2	20	10/16/17 0:00	enb
Cation-Anion Balance	Calculation									
Cation-Anion Balance			3.3			%			10/31/17 0:00	calc
Sum of Anions			0.414	B		meq/L			10/31/17 0:00	calc
Sum of Cations			0.442	B		meq/L			10/31/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	10/10/17 11:07	emk
Chloride	SM4500Cl-E	1	2.5		*	mg/L	0.5	2	10/16/17 13:51	jmm
Conductivity @25C	SM2510B	1	49.4		*	umhos/cm	1	10	10/16/17 16:37	enb
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/11/17 13:07	las
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/09/17 15:44	wtc
Fluoride	SM4500F-C	1	0.05	B	*	mg/L	0.05	0.3	10/12/17 16:39	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		12			mg/L	0.2	5	10/31/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.55		*	mg/L	0.02	0.1	10/19/17 0:59	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/16/17 15:41	wtc
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	10/20/17 22:56	pjb
pH (lab)	SM4500H+ B									
pH		1	7.6	H	*	units	0.1	0.1	10/16/17 0:00	enb
pH measured at		1	22.4		*	C	0.1	0.1	10/16/17 0:00	enb
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/31/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/20/17 13:52	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	10/10/17 22:12	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/18/17 23:22	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	88	H	*	mg/L	10	20	10/09/17 10:49	che
Residue, Non-Filterable (TSS) @105C	SM2540D	1	9.0	BH	*	mg/L	5	20	10/12/17 11:58	ecc
Residue, Total (TS) @ 105C	SM2540B	1	98	H	*	mg/L	10	20	10/10/17 16:10	enb
Sulfate	D516-02/-07 - Turbidimetric	1	5.2		*	mg/L	1	5	10/13/17 12:53	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	10/11/17 12:43	enb
TDS (calculated)	Calculation		24.4			mg/L			10/31/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		3.61						10/31/17 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: **L40390**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40390-01	WG433450	Aluminum, dissolved	M200.7 ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG433651	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG433138	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).
	WG433641	Chloride	SM4500Cl-E	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.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
	WG433651	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG433308	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).
	WG433101	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).
	WG433397	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).
	WG433651	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG433450	Iron, dissolved	M200.7 ICP	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG433686	Mercury, total	M245.1 CVAA	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG433924	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG433626	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).
	WG434131	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			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).
	WG433651	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG434086	Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG433241	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).
	WG433923	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).
	WG433028	Residue, Filterable (TDS) @180C	SM2540C	H3	Sample was received and analyzed past holding time.
			SM2540C	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40390**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
WG433403		Residue, Non-Filterable (TSS) @105C	SM2540D	H3	Sample was received and analyzed past holding time.
			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).
WG433227		Residue, Total (TS) @ 105C	SM2540B	H3	Sample was received and analyzed past holding time.
			SM2540B	Q6	Sample was received above recommended temperature.
WG433515		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.
WG433264		Sulfide as S	SM4500S2-D	H3	Sample was received and analyzed past holding time.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	QB	Method-specified preservation criteria cannot be met due to sample matrix.
			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).
WG433651		Total Alkalinity	SM2320B - Titration	H1	Sample prep or analysis performed past holding time. See case narrative.
			SM2320B - Titration	Q6	Sample was received above recommended temperature.



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-5

ACZ Sample ID: **L40390-01**  
Date Sampled: 09/28/17 10:42  
Date Received: 10/07/17  
Sample Matrix: Surface Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG433707**

Analyst: jmm  
Extract Date: 10/11/17 11:10  
Analysis Date: 10/18/17 12:58

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			UH	0.94	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	71		0.94	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-5

ACZ Sample ID: **L40390-01**

Date Sampled: 09/28/17 10:42

Date Received: 10/07/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG433704

Analyst: GSS

Extract Date:

Analysis Date: 10/17/17 11:47

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: **L40390**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L40390-01</b>	WG433707	*All Compounds*	M8015D GC/FID	Q6	Sample was received above recommended temperature.
		TPH C10 to C28	M8015D GC/FID	H3	Sample was received and analyzed past holding time.
			M8015D GC/FID	Q9	Insufficient sample received to meet method QC requirements.
	WG433704	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

**Tahoe Resources, Inc.**

ACZ Project ID: **L40390**

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: L40390  
 Date Received: 10/07/2017 09:55  
 Received By:  
 Date Printed: 10/9/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
5164	7.9	<=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: L40390  
Date Received: 10/07/2017 09:55  
Received By:  
Date Printed: 10/9/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



# Laboratories, Inc.

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

L40390

## CHAIN of CUSTODY

### Report to:

Name: Luisa Fernanda Barrios  
 Company: Minera San Rafael  
 E-mail: L.Barrios@sanrafael.com.gt

Address: Bivd Los procesos 15 Calle 24-69 Z10  
Empresarial 2 prodom, Torre IV Oficina 1106  
 Telephone: (502) 56964268

### Copy of Report to:

Name: Eva Quedrow@sanrafael.com.gt  
 Company: Minera San Rafael

E-mail: Fsamayoa@sanrafael.com.gt  
 Telephone:

### Invoice to:

Name: Luisa Fernanda Barrios  
 Company:  
 E-mail:

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: L F / EVO 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 #:	PO#:	Reporting state for compliance testing:	Check box if samples include NRC licensed material?	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	SW	Total CN							
	<u>El Escobal</u>			<u>Pileta 3</u>	<u>01-02/10/17</u>	<u>15:30</u>	<u>SW</u>	<u>10</u>	<u>/</u>							
				<u>POZO PP</u>	<u>02/10/17</u>	<u>09:35</u>	<u>GW</u>	<u>10</u>	<u>/</u>							
				<u>SW-5</u>	<u>28/9/17</u>	<u>10:42</u>	<u>SW</u>	<u>10</u>	<u>/</u>							
				<u>Pileta 3</u>	<u>29/9/17</u>	<u>08:50</u>	<u>SW</u>	<u>1</u>		<u>/</u>						
				<u>Pileta 3</u>	<u>01-02/10/17</u>	<u>15:30</u>	<u>SW</u>	<u>1</u>		<u>/</u>						
				<u>TDSW-2</u>	<u>28/09/17</u>	<u>09:10</u>	<u>GW</u>	<u>1</u>		<u>/</u>						

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

### REMARKS

Please report this sample in a single report.

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

RELINQUISHED BY: \_\_\_\_\_ DATE:TIME \_\_\_\_\_ RECEIVED BY: \_\_\_\_\_ DATE:TIME \_\_\_\_\_

JUAN Aguilar

03-10-2017  
05:00

[Signature]  
[Signature]

03/10/17 10:00  
10/3/12 0955



October 02, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39761

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 08, 2017. This project has been assigned to ACZ's project number, L39761. 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 L39761. 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 November 01, 2017. 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.

October 02, 2017

Project ID: Escobal

ACZ Project ID: L39761

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 3 miscellaneous samples from Tahoe Resources, Inc. on September 8, 2017. 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 L39761. 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, 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. TDS (N1) - The oven was out of specifications on 9/11/17. It was within range when the workgroup was removed.
3. Bismuth (N1) - The SIC QC sample had a high recovery for Bismuth. No further action was taken since the associated samples were undetect.



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-8

ACZ Sample ID: **L39761-01**  
Date Sampled: 09/04/17 11:45  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 14:10	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 16:16	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 15:40	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:37	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:27	las
Total Hot Plate Digestion	M200.2 ICP				*				09/28/17 11:12	dcm
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 21:08	mfm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-8

ACZ Sample ID: **L39761-01**

Date Sampled: 09/04/17 11:45

Date Received: 09/08/17

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.16	B		mg/L	0.03	0.2	09/23/17 2:32	aeh
Aluminum, total	M200.7 ICP	1	5.96		*	mg/L	0.03	0.2	09/21/17 0:17	aeh
Antimony, dissolved	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	09/27/17 22:08	mfm
Antimony, total	M200.8 ICP-MS	1	0.0009	B		mg/L	0.0004	0.002	09/28/17 15:29	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0031			mg/L	0.0002	0.001	09/26/17 13:52	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0116			mg/L	0.0002	0.001	09/28/17 15:29	mfm
Barium, dissolved	M200.7 ICP	1	0.102			mg/L	0.003	0.02	09/23/17 2:32	aeh
Barium, total	M200.7 ICP	1	0.150			mg/L	0.003	0.02	09/26/17 1:23	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:32	aeh
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:17	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 2:32	aeh
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/21/17 0:17	aeh
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 12:54	dcm
Boron, total	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/26/17 1:23	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 13:52	bsu
Cadmium, total	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	09/27/17 10:48	msh
Calcium, dissolved	M200.7 ICP	1	27.5			mg/L	0.1	0.5	09/23/17 2:32	aeh
Calcium, total	M200.7 ICP	1	27.6			mg/L	0.1	0.5	09/21/17 0:17	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:32	aeh
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:17	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:32	aeh
Cobalt, total	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/21/17 0:17	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:32	aeh
Copper, total	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	09/26/17 1:23	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 2:32	aeh
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/21/17 0:17	aeh
Iron, dissolved	M200.7 ICP	1	0.13			mg/L	0.02	0.05	09/23/17 2:32	aeh
Iron, total	M200.7 ICP	1	3.13			mg/L	0.02	0.05	09/29/17 20:16	aeh
Lead, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	09/26/17 13:52	bsu
Lead, total	M200.8 ICP-MS	1	0.0074			mg/L	0.0001	0.0005	09/27/17 10:48	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 2:32	aeh
Lithium, total	M200.7 ICP	1	0.011	B		mg/L	0.008	0.04	09/21/17 0:17	aeh
Magnesium, dissolved	M200.7 ICP	1	4.0			mg/L	0.2	1	09/23/17 2:32	aeh
Magnesium, total	M200.7 ICP	1	4.1			mg/L	0.2	1	09/21/17 0:17	aeh
Manganese, dissolved	M200.7 ICP	1	0.080			mg/L	0.005	0.03	09/23/17 2:32	aeh
Manganese, total	M200.7 ICP	1	0.258			mg/L	0.005	0.03	09/21/17 0:17	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:08	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:04	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 2:32	aeh
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/21/17 0:17	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 2:32	aeh
Nickel, total	M200.7 ICP	1	0.011	B		mg/L	0.008	0.04	09/21/17 0:17	aeh
Potassium, dissolved	M200.7 ICP	1	7.2			mg/L	0.2	1	09/23/17 2:32	aeh

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-8

ACZ Sample ID: **L39761-01**  
Date Sampled: 09/04/17 11:45  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	7.9		mg/L	0.2	1	09/21/17 0:17	aeh
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/23/17 2:32	aeh
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/21/17 0:17	aeh
Selenium, dissolved	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0003	09/26/17 13:52	bsu
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/27/17 10:48	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 13:52	bsu
Silver, total	M200.8 ICP-MS	1	0.00009	B	mg/L	0.00005	0.0003	09/27/17 10:48	msh
Sodium, dissolved	M200.7 ICP	1	13.7		mg/L	0.2	1	09/23/17 2:32	aeh
Sodium, total	M200.7 ICP	1	13.8		mg/L	0.2	1	09/21/17 0:17	aeh
Strontium, dissolved	M200.7 ICP	1	0.240		mg/L	0.005	0.03	09/23/17 2:32	aeh
Strontium, total	M200.7 ICP	1	0.237		mg/L	0.005	0.03	09/26/17 1:23	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 13:52	bsu
Thallium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/28/17 15:29	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 2:32	aeh
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/21/17 0:17	aeh
Titanium, dissolved	M200.7 ICP	1	0.010	B	mg/L	0.005	0.03	09/23/17 2:32	aeh
Titanium, total	M200.7 ICP	1	0.177		mg/L	0.005	0.03	09/21/17 0:17	aeh
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 13:52	bsu
Uranium, total	M200.8 ICP-MS	1	0.0003	B	mg/L	0.0001	0.0005	09/27/17 10:48	msh
Vanadium, dissolved	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	09/23/17 2:32	aeh
Vanadium, total	M200.7 ICP	1	0.011	B	mg/L	0.005	0.03	09/21/17 0:17	aeh
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 2:32	aeh
Zinc, total	M200.7 ICP	1	0.03	B	mg/L	0.01	0.05	09/26/17 1:23	dcm

### Tahoe Resources, Inc.

Project ID: Escobal  
Sample ID: SW-8

ACZ Sample ID: **L39761-01**  
Date Sampled: 09/04/17 11:45  
Date Received: 09/08/17  
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	53.0		*	mg/L	2	20	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1	53.0		*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			4.0			%			10/02/17 0:00	calc
Sum of Anions			2.4			meq/L			10/02/17 0:00	calc
Sum of Cations			2.6			meq/L			10/02/17 0:00	calc
Chemical Oxygen Demand	M410.4	1	47		*	mg/L	10	20	09/15/17 11:55	emk
Chloride	SM4500Cl-E	1	11.1		*	mg/L	0.5	2	09/12/17 15:50	jmm
Conductivity @25C	SM2510B	1	253		*	umhos/cm	1	10	09/13/17 3:55	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:29	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:16	pjb
Fluoride	SM4500F-C	1	0.13	B	*	mg/L	0.05	0.3	09/13/17 18:12	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		85			mg/L	0.2	5	10/02/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.75		*	mg/L	0.02	0.1	09/15/17 23:03	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.48		*	mg/L	0.05	0.2	09/14/17 16:59	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	2.6		*	mg/L	0.1	0.5	09/16/17 15:38	pjb
pH (lab)	SM4500H+ B									
pH		1	7.8	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	22.1		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.56			mg/L	0.06	0.2	10/02/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.18		*	mg/L	0.02	0.05	09/19/17 22:55	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.14	H	*	mg/L	0.02	0.05	09/08/17 22:46	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.42		*	mg/L	0.02	0.05	09/19/17 15:51	wtc
Residue, Filterable (TDS) @180C	SM2540C	2	252		*	mg/L	20	40	09/09/17 11:52	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	122		*	mg/L	5	20	09/11/17 10:12	ecc
Residue, Total (TS) @ 105C	SM2540B	1	344		*	mg/L	10	20	09/11/17 16:17	che
Sulfate	D516-02/-07 - Turbidimetric	5	48.9		*	mg/L	5	25	09/12/17 11:04	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 13:52	emk
TDS (calculated)	Calculation		146			mg/L			10/02/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.73						10/02/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-9

ACZ Sample ID: **L39761-02**  
Date Sampled: 09/04/17 10:20  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 14:18	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 16:24	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 15:50	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:42	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:36	las
Total Hot Plate Digestion	M200.2 ICP								09/28/17 11:24	dcm
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 21:19	mfm



**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-9

ACZ Sample ID: **L39761-02**

Date Sampled: 09/04/17 10:20

Date Received: 09/08/17

Sample Matrix: Surface Water

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.12	B		mg/L	0.03	0.2	09/23/17 2:41	aeh
Aluminum, total	M200.7 ICP	1	5.20		*	mg/L	0.03	0.2	09/21/17 0:20	aeh
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/27/17 22:11	mfm
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/28/17 15:32	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0022			mg/L	0.0002	0.001	09/26/17 14:01	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0057			mg/L	0.0002	0.001	09/28/17 15:32	mfm
Barium, dissolved	M200.7 ICP	1	0.061			mg/L	0.003	0.02	09/23/17 2:41	aeh
Barium, total	M200.7 ICP	1	0.099			mg/L	0.003	0.02	09/26/17 1:32	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:41	aeh
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:20	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 2:41	aeh
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/21/17 0:20	aeh
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/25/17 13:03	dcm
Boron, total	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	09/26/17 1:32	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:01	bsu
Cadmium, total	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	09/27/17 10:50	msh
Calcium, dissolved	M200.7 ICP	1	14.0			mg/L	0.1	0.5	09/23/17 2:41	aeh
Calcium, total	M200.7 ICP	1	14.5			mg/L	0.1	0.5	09/21/17 0:20	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:41	aeh
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:20	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:41	aeh
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:20	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:41	aeh
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 1:32	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 2:41	aeh
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/21/17 0:20	aeh
Iron, dissolved	M200.7 ICP	1	0.10			mg/L	0.02	0.05	09/23/17 2:41	aeh
Iron, total	M200.7 ICP	1	2.59			mg/L	0.02	0.05	09/29/17 20:19	aeh
Lead, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	09/26/17 14:01	bsu
Lead, total	M200.8 ICP-MS	1	0.0035			mg/L	0.0001	0.0005	09/27/17 10:50	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 2:41	aeh
Lithium, total	M200.7 ICP	1	0.014	B		mg/L	0.008	0.04	09/21/17 0:20	aeh
Magnesium, dissolved	M200.7 ICP	1	2.8			mg/L	0.2	1	09/23/17 2:41	aeh
Magnesium, total	M200.7 ICP	1	2.9			mg/L	0.2	1	09/21/17 0:20	aeh
Manganese, dissolved	M200.7 ICP	1	0.028	B		mg/L	0.005	0.03	09/23/17 2:41	aeh
Manganese, total	M200.7 ICP	1	0.161			mg/L	0.005	0.03	09/21/17 0:20	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:09	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:05	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 2:41	aeh
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/21/17 0:20	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 2:41	aeh
Nickel, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/21/17 0:20	aeh
Potassium, dissolved	M200.7 ICP	1	4.6			mg/L	0.2	1	09/23/17 2:41	aeh

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-9

ACZ Sample ID: **L39761-02**  
Date Sampled: 09/04/17 10:20  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	5.2		mg/L	0.2	1	09/21/17 0:20	aeh
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/23/17 2:41	aeh
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/21/17 0:20	aeh
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/26/17 14:01	bsu
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/27/17 10:50	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 14:01	bsu
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/27/17 10:50	msh
Sodium, dissolved	M200.7 ICP	1	9.7		mg/L	0.2	1	09/23/17 2:41	aeh
Sodium, total	M200.7 ICP	1	9.6		mg/L	0.2	1	09/21/17 0:20	aeh
Strontium, dissolved	M200.7 ICP	1	0.112		mg/L	0.005	0.03	09/23/17 2:41	aeh
Strontium, total	M200.7 ICP	1	0.114		mg/L	0.005	0.03	09/26/17 1:32	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:01	bsu
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/28/17 15:32	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 2:41	aeh
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/21/17 0:20	aeh
Titanium, dissolved	M200.7 ICP	1	0.007	B	mg/L	0.005	0.03	09/23/17 2:41	aeh
Titanium, total	M200.7 ICP	1	0.155		mg/L	0.005	0.03	09/21/17 0:20	aeh
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:01	bsu
Uranium, total	M200.8 ICP-MS	1	0.0002	B	mg/L	0.0001	0.0005	09/27/17 10:50	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 2:41	aeh
Vanadium, total	M200.7 ICP	1	0.012	B	mg/L	0.005	0.03	09/21/17 0:20	aeh
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 2:41	aeh
Zinc, total	M200.7 ICP	1	0.01	B	mg/L	0.01	0.05	09/26/17 1:32	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-9

ACZ Sample ID: **L39761-02**  
Date Sampled: 09/04/17 10:20  
Date Received: 09/08/17  
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	38.2		*	mg/L	2	20	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1	38.2		*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			3.4			%			10/02/17 0:00	calc
Sum of Anions			1.4			meq/L			10/02/17 0:00	calc
Sum of Cations			1.5			meq/L			10/02/17 0:00	calc
Chemical Oxygen Demand	M410.4	1	23		*	mg/L	10	20	09/15/17 12:03	emk
Chloride	SM4500Cl-E	1	8.3		*	mg/L	0.5	2	09/12/17 15:50	jmm
Conductivity @25C	SM2510B	1	156		*	umhos/cm	1	10	09/13/17 4:04	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:30	wtc
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:32	pjb
Fluoride	SM4500F-C	1	0.10	B	*	mg/L	0.05	0.3	09/13/17 18:16	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		47			mg/L	0.2	5	10/02/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	1.82		*	mg/L	0.02	0.1	09/15/17 23:05	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1	0.07	B	*	mg/L	0.05	0.2	09/14/17 17:02	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.7		*	mg/L	0.1	0.5	09/16/17 15:39	pjb
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	22.1		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.19	B		mg/L	0.06	0.2	10/02/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	09/19/17 22:58	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	09/08/17 22:47	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.14		*	mg/L	0.02	0.05	09/19/17 15:54	wtc
Residue, Filterable (TDS) @180C	SM2540C	2	184		*	mg/L	20	40	09/09/17 11:54	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1	66.0		*	mg/L	5	20	09/11/17 10:14	ecc
Residue, Total (TS) @ 105C	SM2540B	1	240		*	mg/L	10	20	09/11/17 16:20	che
Sulfate	D516-02/-07 - Turbidimetric	1	18.7		*	mg/L	1	5	09/12/17 10:58	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 13:56	emk
TDS (calculated)	Calculation		81.9			mg/L			10/02/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		2.25						10/02/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-10

ACZ Sample ID: **L39761-03**  
Date Sampled: 09/04/17 12:00  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 14:25	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 16:31	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 16:00	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/11/17 15:00	krh
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:40	las
Total Hot Plate Digestion	M200.2 ICP								09/28/17 11:36	dcm
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 21:30	mfm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-10

ACZ Sample ID: **L39761-03**

Date Sampled: 09/04/17 12:00

Date Received: 09/08/17

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	09/23/17 2:44	aeh
Aluminum, total	M200.7 ICP	1	0.04	B	*	mg/L	0.03	0.2	09/21/17 0:23	aeh
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/27/17 22:20	mfm
Antimony, total	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	09/28/17 15:34	mfm
Arsenic, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	09/26/17 14:04	bsu
Arsenic, total	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	09/28/17 15:34	mfm
Barium, dissolved	M200.7 ICP	1		U		mg/L	0.003	0.02	09/23/17 2:44	aeh
Barium, total	M200.7 ICP	1		U		mg/L	0.003	0.02	09/26/17 1:35	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:44	aeh
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:23	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 2:44	aeh
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/21/17 0:23	aeh
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/25/17 13:06	dcm
Boron, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 1:35	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:04	bsu
Cadmium, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/27/17 10:52	msh
Calcium, dissolved	M200.7 ICP	1		U		mg/L	0.1	0.5	09/23/17 2:44	aeh
Calcium, total	M200.7 ICP	1		U		mg/L	0.1	0.5	09/21/17 0:23	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:44	aeh
Chromium, total	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/21/17 0:23	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:44	aeh
Cobalt, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:23	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 2:44	aeh
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 1:35	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 2:44	aeh
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/21/17 0:23	aeh
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/23/17 2:44	aeh
Iron, total	M200.7 ICP	1		U		mg/L	0.02	0.05	09/29/17 20:22	aeh
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/26/17 14:04	bsu
Lead, total	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/27/17 10:52	msh
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 2:44	aeh
Lithium, total	M200.7 ICP	1		U		mg/L	0.008	0.04	09/21/17 0:23	aeh
Magnesium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	09/23/17 2:44	aeh
Magnesium, total	M200.7 ICP	1		U		mg/L	0.2	1	09/21/17 0:23	aeh
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/23/17 2:44	aeh
Manganese, total	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	09/21/17 0:23	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:10	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 17:06	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 2:44	aeh
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/21/17 0:23	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/23/17 2:44	aeh
Nickel, total	M200.7 ICP	1	0.011	B		mg/L	0.008	0.04	09/21/17 0:23	aeh
Potassium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	09/23/17 2:44	aeh



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-10

ACZ Sample ID: **L39761-03**  
Date Sampled: 09/04/17 12:00  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1		U	mg/L	0.2	1	09/21/17 0:23	aeh
Scandium, dissolved	M200.7 ICP	1		U	mg/L	0.1	0.5	09/23/17 2:44	aeh
Scandium, total	M200.7 ICP	1		U	mg/L	0.1	0.5	09/21/17 0:23	aeh
Selenium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/26/17 14:04	bsu
Selenium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0003	09/27/17 10:52	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 14:04	bsu
Silver, total	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/27/17 10:52	msh
Sodium, dissolved	M200.7 ICP	1		U	mg/L	0.2	1	09/23/17 2:44	aeh
Sodium, total	M200.7 ICP	1		U	mg/L	0.2	1	09/21/17 0:23	aeh
Strontium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 2:44	aeh
Strontium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	09/26/17 1:35	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:04	bsu
Thallium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/28/17 15:34	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 2:44	aeh
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/21/17 0:23	aeh
Titanium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 2:44	aeh
Titanium, total	M200.7 ICP	1		U	mg/L	0.005	0.03	09/21/17 0:23	aeh
Uranium, dissolved	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/26/17 14:04	bsu
Uranium, total	M200.8 ICP-MS	1		U	mg/L	0.0001	0.0005	09/27/17 10:52	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 2:44	aeh
Vanadium, total	M200.7 ICP	1	0.008	B	mg/L	0.005	0.03	09/21/17 0:23	aeh
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 2:44	aeh
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	09/26/17 1:35	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: SW-10

ACZ Sample ID: **L39761-03**  
 Date Sampled: 09/04/17 12:00  
 Date Received: 09/08/17  
 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	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			n/a			%			10/02/17 0:00	calc
Sum of Anions				U		meq/L			10/02/17 0:00	calc
Sum of Cations				U		meq/L			10/02/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 12:10	emk
Chloride	SM4500Cl-E	1		U	*	mg/L	0.5	2	09/12/17 15:50	jmm
Conductivity @25C	SM2510B	1		U	*	umhos/cm	1	10	09/13/17 4:12	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:31	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:20	pjb
Fluoride	SM4500F-C	1		U	*	mg/L	0.05	0.3	09/13/17 18:24	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation			U		mg/L	0.2	5	10/02/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	09/15/17 23:06	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/14/17 17:05	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.1	B	*	mg/L	0.1	0.5	09/16/17 15:40	pjb
pH (lab)	SM4500H+ B									
pH		1	6.3	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	22.3		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/02/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/11/17 17:04	wc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/08/17 22:48	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/19/17 15:55	wtc
Residue, Filterable (TDS) @180C	SM2540C	1		U	*	mg/L	10	20	09/09/17 11:57	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/11/17 10:17	ecc
Residue, Total (TS) @ 105C	SM2540B	1		U	*	mg/L	10	20	09/11/17 16:22	che
Sulfate	D516-02/-07 - Turbidimetric	1	1.2	B	*	mg/L	1	5	09/12/17 10:59	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 14:00	emk
TDS (calculated)	Calculation		1.2			mg/L			10/02/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		n/a						10/02/17 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: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39761-01	WG431695	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431695	Bismuth, total	M200.7 ICP	N1	See Case Narrative.
	WG431050	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500Cl-E	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
			SM4500Cl-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).
	WG431050	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).
	WG431174	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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG430866	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).
	WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			(digest)		
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			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).
	WG430882	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG430978	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.
	WG431023	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431050	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).
	WG432296	Total Hot Plate Digestion	M200.2 ICP	QA	Sample container with preservation type specified by the method was not available for analysis. Alternate sample container was used.



Tahoe Resources, Inc.

ACZ Project ID: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39761-02	WG431695	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431695	Bismuth, total	M200.7 ICP	N1	See Case Narrative.
	WG431050	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500Cl-E	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
			SM4500Cl-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).
	WG431050	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).
	WG431174	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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG430866	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).
	WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			(digest)		
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			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).
	WG430882	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG430978	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.
	WG431023	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431050	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.

ACZ Project ID: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39761-03	WG431695	Aluminum, total	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.
	WG431050	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431695	Bismuth, total	M200.7 ICP	N1	See Case Narrative.
	WG431050	Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431318	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).
	WG430990	Chloride	SM4500Cl-E	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			SM4500Cl-E	Q6	Sample was received above recommended temperature.
			SM4500Cl-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).
	WG431050	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).
	WG431174	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).
	WG431078	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).
	WG431127	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).
	WG431050	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG430963	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).
	WG430866	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).
	WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			(digest)		
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			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).
	WG430882	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG430978	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.
	WG431023	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431050	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: SW-8

ACZ Sample ID: **L39761-01**

Date Sampled: 09/04/17 11:45

Date Received: 09/08/17

Sample Matrix: *Surface Water***Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 19:07

Analysis Date: 09/13/17 21:14

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.94	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	78.1		0.94	*	%	60	120



**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-8

ACZ Sample ID: **L39761-01**

Date Sampled: 09/04/17 11:45

Date Received: 09/08/17

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:26

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease		7.9	B	1.11	*	mg/L	2.2	11.1

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-9

ACZ Sample ID: **L39761-02**

Date Sampled: 09/04/17 10:20

Date Received: 09/08/17

Sample Matrix: Surface Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 19:45

Analysis Date: 09/13/17 21:37

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.94	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	78.4		0.94	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-9

ACZ Sample ID: **L39761-02**

Date Sampled: 09/04/17 10:20

Date Received: 09/08/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:29

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.11	*	mg/L	2.2	11.1

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: SW-10ACZ Sample ID: **L39761-03**  
Date Sampled: 09/04/17 12:00  
Date Received: 09/08/17  
Sample Matrix: Surface Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG431066Analyst: gss  
Extract Date: 09/11/17 20:22  
Analysis Date: 09/13/17 22:00

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.94	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	75.7		0.94	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-10

ACZ Sample ID: **L39761-03**

Date Sampled: 09/04/17 12:00

Date Received: 09/08/17

Sample Matrix: Surface Water

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:32

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.04	*	mg/L	2.1	10.4



**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: **L39761**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L39761-01</b>	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
<b>L39761-02</b>	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.
<b>L39761-03</b>	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

**Tahoe Resources, Inc.**

ACZ Project ID: **L39761**

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: L39761  
 Date Received: 09/08/2017 10:17  
 Received By:  
 Date Printed: 9/8/2017

**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? <sup>1</sup>	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		

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
5228	15.5	<=6.0	16	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: L39761  
Date Received: 09/08/2017 10:17  
Received By:  
Date Printed: 9/8/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).





Laboratories, Inc.

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

L39761

CHAIN of CUSTODY

Report to:

Name: Luisa Fernanda Barrios
Company: Minera San Rafael
E-mail: L.Barrios@sanrafael.com.gt

Address: Blvd Las Proceres 18 calle 24. 69 210
Emergencia, 7 vander, Torre IV oficina 1406
Telephone: (502) 5696 4268

Copy of Report to:

Name: Evon Quednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: Evon@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: EVQ 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 10 columns for analyses requested.

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

REMARKS

COC 5/6

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 05-09-2017 and 10:15.

L39761 Chain of Custody



Guatemala, September 4th, 2017

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).

Best regards,

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

October 02, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39760

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 08, 2017. This project has been assigned to ACZ's project number, L39760. 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 L39760. 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 November 01, 2017. 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.

October 02, 2017

Project ID: Escobal

ACZ Project ID: L39760

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 1 miscellaneous sample from Tahoe Resources, Inc. on September 8, 2017. The sample was received in good condition. Upon receipt, the sample custodian removed the sample from the cooler, inspected the contents, and logged the sample into ACZ's computerized Laboratory Information Management System (LIMS). The sample was assigned ACZ LIMS project number L39760. 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**

This sample was 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 the sample with a TDS ratio over 1.2 and a TDS value greater than 150 mg/L, the sample was not retested based on historical re-analysis data and the sample matrix.
2. TDS (N1) - The oven was out of specifications on 9/11/17. It was within range when the workgroup was removed.
3. Bismuth (N1) - The SIC QC sample had a high recovery for Bismuth. No further action was taken since the associated samples were undetect.

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-11

ACZ Sample ID: **L39760-01**  
Date Sampled: 09/04/17 11:20  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/13/17 14:03	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/12/17 16:09	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/14/17 15:31	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 16:33	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/14/17 11:18	las
Total Hot Plate Digestion	M200.2 ICP								09/28/17 11:00	dcm
Total Hot Plate Digestion	M200.2 ICP-MS								09/20/17 20:57	mfm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-11

ACZ Sample ID: **L39760-01**

Date Sampled: 09/04/17 11:20

Date Received: 09/08/17

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	09/23/17 5:47	dcm
Aluminum, total	M200.7 ICP	1	0.18	B	*	mg/L	0.03	0.2	09/21/17 0:14	aeh
Antimony, dissolved	M200.8 ICP-MS	1	0.0071			mg/L	0.0004	0.002	09/27/17 22:04	mfm
Antimony, total	M200.8 ICP-MS	1	0.0067			mg/L	0.0004	0.002	09/28/17 15:27	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0067			mg/L	0.0002	0.001	09/26/17 13:42	bsu
Arsenic, total	M200.8 ICP-MS	1	0.0073			mg/L	0.0002	0.001	09/28/17 15:27	mfm
Barium, dissolved	M200.7 ICP	1	0.065			mg/L	0.003	0.02	09/23/17 5:47	dcm
Barium, total	M200.7 ICP	1	0.065			mg/L	0.003	0.02	09/26/17 1:20	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:47	dcm
Beryllium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:14	aeh
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/23/17 5:47	dcm
Bismuth, total	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/21/17 0:14	aeh
Boron, dissolved	M200.7 ICP	1	0.07			mg/L	0.01	0.05	09/23/17 5:47	dcm
Boron, total	M200.7 ICP	1	0.09			mg/L	0.01	0.05	09/26/17 1:20	dcm
Cadmium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	09/26/17 13:42	bsu
Cadmium, total	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	09/27/17 10:46	msh
Calcium, dissolved	M200.7 ICP	1	188			mg/L	0.1	0.5	09/23/17 5:47	dcm
Calcium, total	M200.7 ICP	1	209			mg/L	0.1	0.5	09/21/17 0:14	aeh
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:47	dcm
Chromium, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/21/17 0:14	aeh
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:47	dcm
Cobalt, total	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/21/17 0:14	aeh
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/23/17 5:47	dcm
Copper, total	M200.7 ICP	1		U		mg/L	0.01	0.05	09/26/17 1:20	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/23/17 5:47	dcm
Gallium, total	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/21/17 0:14	aeh
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/23/17 5:47	dcm
Iron, total	M200.7 ICP	1	0.09			mg/L	0.02	0.05	09/29/17 20:13	aeh
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	09/26/17 13:42	bsu
Lead, total	M200.8 ICP-MS	1	0.005			mg/L	0.0001	0.0005	09/27/17 10:46	msh
Lithium, dissolved	M200.7 ICP	1	0.040			mg/L	0.008	0.04	09/23/17 5:47	dcm
Lithium, total	M200.7 ICP	1	0.050			mg/L	0.008	0.04	09/21/17 0:14	aeh
Magnesium, dissolved	M200.7 ICP	1	13.7			mg/L	0.2	1	09/23/17 5:47	dcm
Magnesium, total	M200.7 ICP	1	15.1			mg/L	0.2	1	09/21/17 0:14	aeh
Manganese, dissolved	M200.7 ICP	1	0.133			mg/L	0.005	0.03	09/23/17 5:47	dcm
Manganese, total	M200.7 ICP	1	0.170			mg/L	0.005	0.03	09/21/17 0:14	aeh
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 18:07	sck
Mercury, total	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/19/17 16:54	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/23/17 5:47	dcm
Molybdenum, total	M200.7 ICP	1		U		mg/L	0.02	0.1	09/21/17 0:14	aeh
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/25/17 12:51	dcm
Nickel, total	M200.7 ICP	1	0.009	B		mg/L	0.008	0.04	09/21/17 0:14	aeh
Potassium, dissolved	M200.7 ICP	1	7.0			mg/L	0.2	1	09/23/17 5:47	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-11

ACZ Sample ID: **L39760-01**  
Date Sampled: 09/04/17 11:20  
Date Received: 09/08/17  
Sample Matrix: Surface Water

Potassium, total	M200.7 ICP	1	7.4		mg/L	0.2	1	09/21/17 0:14	aeh
Scandium, dissolved	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/23/17 5:47	dcm
Scandium, total	M200.7 ICP	1		U *	mg/L	0.1	0.5	09/21/17 0:14	aeh
Selenium, dissolved	M200.8 ICP-MS	1	0.0006		mg/L	0.0001	0.0003	09/26/17 13:42	bsu
Selenium, total	M200.8 ICP-MS	1	0.0007		mg/L	0.0001	0.0003	09/27/17 10:46	msh
Silver, dissolved	M200.8 ICP-MS	1		U	mg/L	0.00005	0.0003	09/26/17 13:42	bsu
Silver, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.00005	0.0003	09/27/17 10:46	msh
Sodium, dissolved	M200.7 ICP	1	37.1		mg/L	0.2	1	09/23/17 5:47	dcm
Sodium, total	M200.7 ICP	1	41.5		mg/L	0.2	1	09/21/17 0:14	aeh
Strontium, dissolved	M200.7 ICP	1	2.08		mg/L	0.005	0.03	09/23/17 5:47	dcm
Strontium, total	M200.7 ICP	1	2.32		mg/L	0.005	0.03	09/26/17 1:20	dcm
Thallium, dissolved	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/26/17 13:42	bsu
Thallium, total	M200.8 ICP-MS	1	0.0001	B	mg/L	0.0001	0.0005	09/28/17 15:27	mfm
Tin, dissolved	M200.7 ICP	1		U	mg/L	0.04	0.2	09/23/17 5:47	dcm
Tin, total	M200.7 ICP	1		U	mg/L	0.04	0.2	09/21/17 0:14	aeh
Titanium, dissolved	M200.7 ICP	1	0.011	B	mg/L	0.005	0.03	09/23/17 5:47	dcm
Titanium, total	M200.7 ICP	1	0.013	B	mg/L	0.005	0.03	09/21/17 0:14	aeh
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B	mg/L	0.0001	0.0005	09/26/17 13:42	bsu
Uranium, total	M200.8 ICP-MS	1	0.0003	B	mg/L	0.0001	0.0005	09/27/17 10:46	msh
Vanadium, dissolved	M200.7 ICP	1		U	mg/L	0.005	0.03	09/23/17 5:47	dcm
Vanadium, total	M200.7 ICP	1	0.006	B	mg/L	0.005	0.03	09/21/17 0:14	aeh
Zinc, dissolved	M200.7 ICP	1		U	mg/L	0.01	0.05	09/23/17 5:47	dcm
Zinc, total	M200.7 ICP	1		U	mg/L	0.01	0.05	09/26/17 1:20	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SW-11

ACZ Sample ID: **L39760-01**  
Date Sampled: 09/04/17 11:20  
Date Received: 09/08/17  
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	69.9		*	mg/L	2	20	09/13/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/13/17 0:00	emk
Total Alkalinity		1	69.9		*	mg/L	2	20	09/13/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-4.0			%			10/02/17 0:00	calc
Sum of Anions			13			meq/L			10/02/17 0:00	calc
Sum of Cations			12			meq/L			10/02/17 0:00	calc
Chemical Oxygen Demand	M410.4	1		U	*	mg/L	10	20	09/15/17 11:48	emk
Chloride	SM4500Cl-E	1	34.5		*	mg/L	0.5	2	09/12/17 15:50	jmm
Conductivity @25C	SM2510B	1	1200		*	umhos/cm	1	10	09/13/17 3:47	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/13/17 16:28	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/12/17 22:15	pjb
Fluoride	SM4500F-C	1	0.64		*	mg/L	0.05	0.3	09/13/17 17:57	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		526			mg/L	0.2	5	10/02/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	1.65		*	mg/L	0.02	0.1	09/15/17 23:01	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/14/17 16:57	wtc/las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	09/16/17 15:37	pjb
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	09/13/17 0:00	emk
pH measured at		1	22.0		*	C	0.1	0.1	09/13/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/02/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/19/17 22:54	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/08/17 22:45	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	09/19/17 15:49	wtc
Residue, Filterable (TDS) @180C	SM2540C	1	950		*	mg/L	10	20	09/09/17 11:49	emk
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/11/17 10:09	ecc
Residue, Total (TS) @ 105C	SM2540B	1	974		*	mg/L	10	20	09/11/17 16:15	che
Sulfate	D516-02/-07 - Turbidimetric	20	489		*	mg/L	20	100	09/12/17 11:37	jmm
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/12/17 13:48	emk
TDS (calculated)	Calculation		815			mg/L			10/02/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.17						10/02/17 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: **L39760**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39760-01	WG431695	Aluminum, total	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.
		Bismuth, total	M200.7 ICP	N1	See Case Narrative.
	WG431318	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).
	WG430990	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.
			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).
	WG431050	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).
	WG431174	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).
	WG431078	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).
	WG431127	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).
	WG431389	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG431249	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).
	WG431394	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).
	WG431050	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG430866	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).
	WG431597	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG430871	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39760**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			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).
	WG430882	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).
	WG430949	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG431004	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG431023	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431050	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: SW-11

ACZ Sample ID: **L39760-01**

Date Sampled: 09/04/17 11:20

Date Received: 09/08/17

Sample Matrix: Surface Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431066

Analyst: gss

Extract Date: 09/11/17 18:30

Analysis Date: 09/13/17 20:27

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.94	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	80		0.94	*	%	60	120



**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SW-11

ACZ Sample ID: **L39760-01**

Date Sampled: 09/04/17 11:20

Date Received: 09/08/17

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

Extract Method:

**Workgroup:** WG431095

Analyst: jmm

Extract Date:

Analysis Date: 09/13/17 10:24

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Oil and Grease			U	1.08	*	mg/L	2.2	10.8

**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: **L39760**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L39760-01</b>	WG431066	*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.
	WG431095	Oil and Grease	1664A - Gravimetric	Q6	Sample was received above recommended temperature.

**Tahoe Resources, Inc.**

ACZ Project ID: **L39760**

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: L39760  
 Date Received: 09/08/2017 10:17  
 Received By:  
 Date Printed: 9/8/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
5158	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.**  
Escobal

ACZ Project ID: L39760  
Date Received: 09/08/2017 10:17  
Received By:  
Date Printed: 9/8/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).





Laboratories, Inc.

L39760

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrios
Company: Minera San Rafael
E-mail: L.Barrios@sanrafael.com.gt

Address: Blvd Los Proceres 18 calle 24-69 210
(Industrial, 2 Dadera, Torre W oficina)
Telephone: (502) 5696 4268

Copy of Report to:

Name: Lynn @:edrow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: Frumayon@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: EVA 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 multiple columns for ANALYSES REQUESTED.

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

REMARKS

COC 6/6

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.



Guatemala, September 4th, 2017

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).

Best regards,

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



**ECOSISTEMAS**  
PROYECTOS AMBIENTALES

LABORATORIO AMBIENTAL E INDUSTRIAL

17 avenida 2-39 zona 4 Mixco | Guatemala | Ofibodegas Zaragoza 2 | Bodega 2  
502 + 2437 7224 | 2437 4455  
laboratorio@ecosistemas.com.gt | info@ecosistemas.com.gt | www.ecosistemas.com.gt

Ref 2301-17  
Pag 1/1

REG 016 Resultados de Análisis

Muestras: 13 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: 040917  
Fecha de ingreso de muestra: 050917  
Fecha de análisis: 050917-180917  
Fecha del informe: 180917

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 <sub>5</sub> mg/l	* Demanda Química de Oxígeno DQO mg/l	* Cromo Hexavalente Cr(VI) mg/l	** Coliformes Fecales (NMP/100ml)
9604	SW-2	69	5	<10	<25	<0.05	2.40E+02
9605	SW-1	102	10	<10	<25	<0.05	7.00E+02
9606	SW-2A	45	2	<10	<25	<0.05	7.00E+01
9607	SW-2B	10	<1	<10	<25	<0.05	4.90E+02
9608	SW-4A	348	40	<10	39	<0.05	4.90E+04
9609	SW-3	201	68	<10	<25	<0.05	2.20E+03
9610	SW-6	179	50	<10	<25	<0.05	4.90E+02
9611	SW-7	218	63	<10	<25	<0.05	4.90E+02
9612	SW-8	456	36	<10	80	<0.05	3.50E+05
9613	SW-9	298	63	<10	47	<0.05	1.30E+05
9614	SW-10	1	<1	<10	<25	<0.05	<1.8
9615	SW-11	42	8	<10	<25	<0.05	1.30E+03
9617	SW-4	166	25	<10	<25	<0.05	2.40E+04

**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.

Limites 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 NTG/ISO/IEC 17025:2005 según OGA LE 006-04

\*\* Análisis referidos a laboratorio acreditado.

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: 280917  
Fecha de ingreso de muestra: 290917  
Fecha de análisis: 290917-101017  
Fecha del informe: 101017

Resultados:

Correlativo Ecosistemas	Identificación de la Muestra	Color Aparente (UC HZ equiv. Unid. Pt-Co)	Color Real (UC HZ equiv. Unid. Pt-Co)	* Demanda Química de Oxígeno DQO mg/l	* Cromo Hexavalente Cr(VI) mg/l	** Coliformes Fecales (NMP/100ml)
10076	SW-5	50	14	<25	<0.05	4.90E+02

**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.

Límites de detección: Cromo hexavalente (0.05 mg/l); DQO (25 mg/l).

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 referidos a laboratorio acreditado.



Ing. Oscar Páez  
Gerente Técnico



VoBo Ing. Fernando Fuentes  
Gerente de Calidad



### **12.5.2 Muestras de Agua Subterránea (GW) pozos de monitoreo y suministro**

October 10, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39913

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 15, 2017. This project has been assigned to ACZ's project number, L39913. 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 L39913. 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 November 09, 2017. 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.

October 10, 2017

Project ID: Escobal

ACZ Project ID: L39913

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 5 ground water samples from Tahoe Resources, Inc. on September 15, 2017. 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 L39913. 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 an "HE" or an "H1", received 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. TDS (N1) - The 05 degree Celsius oven read out of specifications for low reading on Monday morning. Analyst believes that the thermometer was not reset for the weekend.
2. 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-1A

ACZ Sample ID: **L39913-01**

Date Sampled: 09/12/17 05:32

Date Received: 09/15/17

Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 12:43	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 11:59	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/27/17 13:33	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/19/17 17:40	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:18	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.21			mg/L	0.03	0.2	09/28/17 15:46	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/06/17 15:30	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.001			mg/L	0.0002	0.001	09/29/17 15:18	bsu
Barium, dissolved	M200.7 ICP	1	0.030			mg/L	0.003	0.02	09/29/17 11:02	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:46	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 15:46	dcm
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/28/17 15:46	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:18	bsu
Calcium, dissolved	M200.7 ICP	1	4.6			mg/L	0.1	0.5	09/28/17 15:46	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:46	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:46	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:46	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 15:46	dcm
Iron, dissolved	M200.7 ICP	1	0.17			mg/L	0.02	0.05	09/28/17 15:46	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0004	B		mg/L	0.0001	0.0005	09/29/17 15:18	bsu
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 15:46	dcm
Magnesium, dissolved	M200.7 ICP	1	2.6			mg/L	0.2	1	09/28/17 15:46	dcm
Manganese, dissolved	M200.7 ICP	1	0.023	B		mg/L	0.005	0.03	09/28/17 15:46	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:30	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 15:46	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 15:46	dcm
Potassium, dissolved	M200.7 ICP	1	8.1			mg/L	0.2	1	09/28/17 15:46	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 15:46	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0003	09/29/17 15:18	bsu
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/29/17 15:18	bsu
Sodium, dissolved	M200.7 ICP	1	17.0			mg/L	0.2	1	09/28/17 15:46	dcm
Strontium, dissolved	M200.7 ICP	1	0.044		*	mg/L	0.005	0.03	09/28/17 15:46	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:18	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 15:46	dcm
Titanium, dissolved	M200.7 ICP	1	0.013	B		mg/L	0.005	0.03	09/28/17 15:46	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	09/29/17 15:18	bsu
Vanadium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	09/28/17 15:46	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:46	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: GW-1A

ACZ Sample ID: **L39913-01**  
 Date Sampled: 09/12/17 05:32  
 Date Received: 09/15/17  
 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	21.6		*	mg/L	2	20	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1	21.6		*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			10/10/17 0:00	calc
Sum of Anions			1.4			meq/L			10/10/17 0:00	calc
Sum of Cations			1.4			meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1	21.4		*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	167		*	umhos/cm	1	10	09/22/17 16:46	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:22	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:06	wtc
Fluoride	SM4500F-C	1	0.07	B	*	mg/L	0.05	0.3	09/22/17 15:14	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		22			mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	4.00		*	mg/L	0.02	0.1	09/26/17 23:37	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:08	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.8		*	mg/L	0.1	0.5	09/27/17 22:13	pjb
pH (lab)	SM4500H+ B									
pH		1	7.4	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	22.4		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.16	B		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	09/19/17 23:16	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	09/15/17 20:41	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.07		*	mg/L	0.02	0.05	10/04/17 22:09	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	224		*	mg/L	10	20	09/17/17 13:59	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:39	ecc
Residue, Total (TS) @ 105C	SM2540B	1	262		*	mg/L	10	20	09/18/17 16:29	che
Sulfate	D516-02/-07 - Turbidimetric	1	16.8		*	mg/L	1	5	09/26/17 10:39	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/20/17 17:26	enb
TDS (calculated)	Calculation		84.2			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		2.66						10/10/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: GW-2

ACZ Sample ID: **L39913-02**  
Date Sampled: 09/12/17 11:00  
Date Received: 09/15/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 12:58	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 12:13	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/27/17 13:40	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 11:39	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:22	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.08	B		mg/L	0.03	0.2	09/28/17 15:55	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0012	B		mg/L	0.0004	0.002	10/06/17 15:32	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0106			mg/L	0.0002	0.001	09/29/17 15:21	bsu
Barium, dissolved	M200.7 ICP	1	0.113			mg/L	0.003	0.02	09/29/17 11:05	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:55	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 15:55	dcm
Boron, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/28/17 15:55	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:21	bsu
Calcium, dissolved	M200.7 ICP	1	9.6			mg/L	0.1	0.5	09/28/17 15:55	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:55	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:55	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:55	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 15:55	dcm
Iron, dissolved	M200.7 ICP	1	0.05			mg/L	0.02	0.05	09/28/17 15:55	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:21	bsu
Lithium, dissolved	M200.7 ICP	1	0.010	B		mg/L	0.008	0.04	09/28/17 15:55	dcm
Magnesium, dissolved	M200.7 ICP	1	2.0			mg/L	0.2	1	09/28/17 15:55	dcm
Manganese, dissolved	M200.7 ICP	1	0.034			mg/L	0.005	0.03	09/28/17 15:55	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:31	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 15:55	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 15:55	dcm
Potassium, dissolved	M200.7 ICP	1	1.2			mg/L	0.2	1	09/28/17 15:55	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 15:55	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	09/29/17 15:21	bsu
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/29/17 15:21	bsu
Sodium, dissolved	M200.7 ICP	1	5.7			mg/L	0.2	1	09/28/17 15:55	dcm
Strontium, dissolved	M200.7 ICP	1	0.091		*	mg/L	0.005	0.03	09/28/17 15:55	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:21	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 15:55	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 15:55	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:21	bsu
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 15:55	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:55	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: GW-2

ACZ Sample ID: **L39913-02**  
 Date Sampled: 09/12/17 11:00  
 Date Received: 09/15/17  
 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	30.2		*	mg/L	2	20	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1	30.2		*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			3.6			%			10/10/17 0:00	calc
Sum of Anions			0.876			meq/L			10/10/17 0:00	calc
Sum of Cations			0.942			meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1	3.5		*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	103		*	umhos/cm	1	10	09/22/17 16:54	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:24	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:08	wtc
Fluoride	SM4500F-C	1	0.15	B	*	mg/L	0.05	0.3	09/22/17 15:19	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		32			mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.76		*	mg/L	0.02	0.1	09/26/17 23:42	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:11	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1	0.4	B	*	mg/L	0.1	0.5	09/27/17 22:14	pjb
pH (lab)	SM4500H+ B									
pH		1	7.0	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	22.3		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.19	B		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	09/27/17 23:46	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	09/15/17 20:42	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.11		*	mg/L	0.02	0.05	10/04/17 22:10	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	162		*	mg/L	10	20	09/17/17 14:01	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:41	ecc
Residue, Total (TS) @ 105C	SM2540B	1	176		*	mg/L	10	20	09/18/17 16:30	che
Sulfate	D516-02/-07 - Turbidimetric	1	7.9		*	mg/L	1	5	09/26/17 10:39	las
Sulfide as S	SM4500S2-D	1	0.02	BH	*	mg/L	0.02	0.1	09/20/17 17:29	enb
TDS (calculated)	Calculation		48.7			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		3.33						10/10/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: GW-3

ACZ Sample ID: **L39913-03**

Date Sampled: 09/12/17 12:00

Date Received: 09/15/17

Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 13:05	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 12:28	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/27/17 13:47	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 11:49	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:27	wtc

**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	09/28/17 15:58	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/06/17 15:42	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.002			mg/L	0.0002	0.001	09/29/17 15:24	bsu
Barium, dissolved	M200.7 ICP	1	0.085			mg/L	0.003	0.02	09/29/17 11:14	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:58	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 15:58	dcm
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/28/17 15:58	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:24	bsu
Calcium, dissolved	M200.7 ICP	1	45.3			mg/L	0.1	0.5	09/28/17 15:58	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:58	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:58	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:58	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 15:58	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/28/17 15:58	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:24	bsu
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 15:58	dcm
Magnesium, dissolved	M200.7 ICP	1	10.1			mg/L	0.2	1	09/28/17 15:58	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 15:58	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:32	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 15:58	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 15:58	dcm
Potassium, dissolved	M200.7 ICP	1	7.9			mg/L	0.2	1	09/28/17 15:58	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 15:58	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0003			mg/L	0.0001	0.0003	09/29/17 15:24	bsu
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/29/17 15:24	bsu
Sodium, dissolved	M200.7 ICP	1	17.7			mg/L	0.2	1	09/28/17 15:58	dcm
Strontium, dissolved	M200.7 ICP	1	0.248		*	mg/L	0.005	0.03	09/28/17 15:58	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:24	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 15:58	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 15:58	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:24	bsu
Vanadium, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	09/28/17 15:58	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 15:58	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: GW-3

ACZ Sample ID: **L39913-03**  
 Date Sampled: 09/12/17 12:00  
 Date Received: 09/15/17  
 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	63.1		*	mg/L	2	20	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1	63.1		*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.5			%			10/10/17 0:00	calc
Sum of Anions			3.9			meq/L			10/10/17 0:00	calc
Sum of Cations			4.1			meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1	10.7		*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	425		*	umhos/cm	1	10	09/22/17 17:03	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:25	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:10	wtc
Fluoride	SM4500F-C	1	0.20	B	*	mg/L	0.05	0.3	09/22/17 15:22	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		155			mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	3.21		*	mg/L	0.02	0.1	09/26/17 23:43	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:14	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/27/17 22:15	pjb
pH (lab)	SM4500H+ B									
pH		1	7.3	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	22.5		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/27/17 23:48	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.02	BH	*	mg/L	0.02	0.05	09/15/17 20:43	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	10/04/17 22:11	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	346		*	mg/L	10	20	09/17/17 14:04	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:44	ecc
Residue, Total (TS) @ 105C	SM2540B	1	374		*	mg/L	10	20	09/18/17 16:32	che
Sulfate	D516-02/-07 - Turbidimetric	5	110		*	mg/L	5	25	09/26/17 10:45	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/20/17 17:32	enb
TDS (calculated)	Calculation		241			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.44						10/10/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: GW-11

ACZ Sample ID: **L39913-04**

Date Sampled: 09/12/17 12:00

Date Received: 09/15/17

Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 13:12	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 12:35	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/27/17 13:54	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 11:58	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:32	wtc

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	09/28/17 16:01	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/06/17 15:44	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.002			mg/L	0.0002	0.001	09/29/17 15:33	bsu
Barium, dissolved	M200.7 ICP	1	0.086			mg/L	0.003	0.02	09/29/17 11:17	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:01	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 16:01	dcm
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	09/28/17 16:01	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:33	bsu
Calcium, dissolved	M200.7 ICP	1	45.1			mg/L	0.1	0.5	09/28/17 16:01	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:01	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:01	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:01	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:01	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/28/17 16:01	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:33	bsu
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 16:01	dcm
Magnesium, dissolved	M200.7 ICP	1	10.0			mg/L	0.2	1	09/28/17 16:01	dcm
Manganese, dissolved	M200.7 ICP	1	0.005	B		mg/L	0.005	0.03	09/28/17 16:01	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:33	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 16:01	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 16:01	dcm
Potassium, dissolved	M200.7 ICP	1	7.9			mg/L	0.2	1	09/28/17 16:01	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:01	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0004			mg/L	0.0001	0.0003	09/29/17 15:33	bsu
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/29/17 15:33	bsu
Sodium, dissolved	M200.7 ICP	1	17.6			mg/L	0.2	1	09/28/17 16:01	dcm
Strontium, dissolved	M200.7 ICP	1	0.246		*	mg/L	0.005	0.03	09/28/17 16:01	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:33	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 16:01	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:01	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:33	bsu
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:01	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:01	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: GW-11

ACZ Sample ID: **L39913-04**  
 Date Sampled: 09/12/17 12:00  
 Date Received: 09/15/17  
 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	63.5		*	mg/L	2	20	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1	63.5		*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			1.2			%			10/10/17 0:00	calc
Sum of Anions			4			meq/L			10/10/17 0:00	calc
Sum of Cations			4.1			meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1	10.8		*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	427		*	umhos/cm	1	10	09/22/17 17:19	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:26	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:11	wtc
Fluoride	SM4500F-C	1	0.20	B	*	mg/L	0.05	0.3	09/22/17 15:26	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		154			mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	3.22		*	mg/L	0.02	0.1	09/26/17 23:45	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:20	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	09/27/17 22:16	pjb
pH (lab)	SM4500H+ B									
pH		1	7.4	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	22.7		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/27/17 23:57	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.02	BH	*	mg/L	0.02	0.05	09/15/17 20:44	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	10/04/17 22:12	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	334		*	mg/L	10	20	09/17/17 14:07	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:47	ecc
Residue, Total (TS) @ 105C	SM2540B	1	372		*	mg/L	10	20	09/18/17 16:34	che
Sulfate	D516-02/-07 - Turbidimetric	5	114		*	mg/L	5	25	09/26/17 10:45	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/20/17 17:36	enb
TDS (calculated)	Calculation		245			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.36						10/10/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: GW-10

ACZ Sample ID: **L39913-05**  
Date Sampled: 09/12/17 12:00  
Date Received: 09/15/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 13:19	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 12:42	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/27/17 14:01	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:03	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:37	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.03	0.2	09/28/17 16:04	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/06/17 15:46	msh
Arsenic, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0002	0.001	09/29/17 15:43	bsu
Barium, dissolved	M200.7 ICP	1		U		mg/L	0.003	0.02	09/29/17 11:20	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:04	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 16:04	dcm
Boron, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	09/28/17 16:04	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:43	bsu
Calcium, dissolved	M200.7 ICP	1	0.1	B		mg/L	0.1	0.5	09/28/17 16:04	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:04	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:04	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:04	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:04	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/28/17 16:04	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:43	bsu
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 16:04	dcm
Magnesium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	09/28/17 16:04	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:04	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:34	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 16:04	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 16:04	dcm
Potassium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	09/28/17 16:04	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:04	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	09/29/17 15:43	bsu
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/29/17 15:43	bsu
Sodium, dissolved	M200.7 ICP	1		U		mg/L	0.2	1	09/28/17 16:04	dcm
Strontium, dissolved	M200.7 ICP	1	0.006	B	*	mg/L	0.005	0.03	09/28/17 16:04	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:43	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 16:04	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:04	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:43	bsu
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:04	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:04	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: GW-10

ACZ Sample ID: **L39913-05**  
 Date Sampled: 09/12/17 12:00  
 Date Received: 09/15/17  
 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	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			n/a			%			10/10/17 0:00	calc
Sum of Anions			N/A			meq/L			10/10/17 0:00	calc
Sum of Cations				U		meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1		U	*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	1.5	B	*	umhos/cm	1	10	09/22/17 17:27	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:27	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:11	wtc
Fluoride	SM4500F-C	1		U	*	mg/L	0.05	0.3	09/22/17 15:34	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		0.3	B		mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	09/26/17 23:46	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	09/27/17 14:21	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/27/17 22:20	pjb
pH (lab)	SM4500H+ B									
pH		1	6.4	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	21.7		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/27/17 23:58	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/15/17 20:46	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/04/17 22:14	pjb
Residue, Filterable (TDS) @180C	SM2540C	1		U	*	mg/L	10	20	09/17/17 14:09	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:49	ecc
Residue, Total (TS) @ 105C	SM2540B	1		U	*	mg/L	10	20	09/18/17 16:37	che
Sulfate	D516-02/-07 - Turbidimetric	1		U	*	mg/L	1	5	09/26/17 10:55	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/20/17 17:45	enb
TDS (calculated)	Calculation		0.136			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		n/a						10/10/17 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: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39913-01	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	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.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	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).
	WG432110	Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	Q6	Sample was received above recommended temperature.
	WG432286	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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG431620	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	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.
	WG432104	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
			D516-02/-07 - Turbidimetric	RA	Relative 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: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39913-02	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	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.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	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).
	WG432110	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).
	WG432286	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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG432288	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	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.
	WG432104	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39913-03	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	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.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	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).
	WG432110	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).
	WG432212	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432286		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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG432288	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	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

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					or LFB) was acceptable.
	WG432104	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39913-04	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	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.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	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).
	WG432110	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).
	WG432286	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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG432288	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	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.
	WG432104	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39913-05	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	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.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432110	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).
	WG432212	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432286		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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG432288	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	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.
	WG432104	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: GW-1AACZ Sample ID: **L39913-01**  
Date Sampled: 09/12/17 5:32  
Date Received: 09/15/17  
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG431740Analyst: jmm  
Extract Date: 09/18/17 14:15  
Analysis Date: 09/21/17 12:26

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.1	J	0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	71.1		0.95	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: GW-2

ACZ Sample ID: **L39913-02**

Date Sampled: 09/12/17 11:00

Date Received: 09/15/17

Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431740

Analyst: jmm

Extract Date: 09/18/17 14:25

Analysis Date: 09/21/17 12:50

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	73.6		0.93	*	%	60	120



**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: GW-3

ACZ Sample ID: **L39913-03**

Date Sampled: 09/12/17 12:00

Date Received: 09/15/17

Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG431740

Analyst: jmm

Extract Date: 09/18/17 14:35

Analysis Date: 09/21/17 13:13

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	75.2		1.02	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: GW-11

ACZ Sample ID: **L39913-04**  
Date Sampled: 09/12/17 12:00  
Date Received: 09/15/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG431740**

Analyst: jmm  
Extract Date: 09/18/17 14:45  
Analysis Date: 09/21/17 13:37

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	71.5		0.93	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: GW-10

ACZ Sample ID: **L39913-05**  
Date Sampled: 09/12/17 12:00  
Date Received: 09/15/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG431740**

Analyst: jmm  
Extract Date: 09/18/17 14:55  
Analysis Date: 09/21/17 14:00

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	72.8		0.93	*	%	60	120

**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: **L39913**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L39913-01</b>	WG431740	*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.
<b>L39913-02</b>	WG431740	*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.
<b>L39913-03</b>	WG431740	*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.
<b>L39913-04</b>	WG431740	*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.
<b>L39913-05</b>	WG431740	*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: **L39913**

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: L39913  
 Date Received: 09/15/2017 14:18  
 Received By:  
 Date Printed: 9/15/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
5149	9.5	<=6.0	14	N/A
5153	10	<=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: L39913  
Date Received: 09/15/2017 14:18  
Received By:  
Date Printed: 9/15/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).

**Report to:**

Name: Luisa fernanda BARRIOS  
 Company: Minera San Rafael  
 E-mail: L.BARRIOS@sanrafael.com.gt

Address: Blvd los próceres 15 calle 24. 69210  
 Empresarial, 2 planta Torre IV Oficina 10  
 Telephone: (502) 5696 2268

**Copy of Report to:**

Name: E Von (vednow@sanrafael.com.gt)  
 Company: Minera San Rafael

E-mail: F.Samayoa@sanrafael.com.gt  
 Telephone:

**Invoice to:**

Name: Luisa fernanda BARRIOS  
 Company:  
 E-mail:

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: EVO 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)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers										
GW-1A	12-09-17 05:32	GW	8	1									
GW-2	12-09-17 11:00	GW	8	1									
GW-3	12-09-17 12:00	GW	8	1									
GW-11	12-09-17 12:00	GW	8	1									

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

**REMARKS**

COC #1: Please include from COC #1 the ~~PSA~~ GW-10 sample analysis results on this project report.

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

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Juan Aguilera	13-09-2017 11:30	Fronso Calalab	13/9/17 12:00
		Evo	9/15/17 1418

L39913 Chain of Custody



Laboratories, Inc.

L39913

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrios
Company: Minería San Rafael
E-mail: LBarrios@sanrafael.com.gt

Address: Blvd los Proceres 19 calle 24-69 210
Empresarial, 2 Plazuela Torre W oficina 1406
Telephone: (502) 5696 4268

Copy of Report to:

Name: EvonQuednow@sanrafael.com.gt
Company: Minería San Rafael

E-mail: fsema@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: EVQ 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)

Table with columns: Quote #, PO#, Reporting state, Check box, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, and multiple columns for analyses requested.

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

REMARKS

COC # 2
Please refer to ACZ's terms & conditions located on the reverse side of this COC.

COPY

RELINQUISHED BY: DATE:TIME RECEIVED BY: DATE:TIME

Juan Aguilar 13/09/17 Irene Catalan 13/09/17 12:00
EIS 9/15/17 19K



Guatemala September 13ht 2017

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.

October 19, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L40055

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 22, 2017. This project has been assigned to ACZ's project number, L40055. 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 L40055. 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 November 18, 2017. 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.

October 19, 2017

Project ID: Escobal

ACZ Project ID: L40055

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 12 ground water samples from Tahoe Resources, Inc. on September 21, 2017. 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 L40055. 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, 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: PSA-1

ACZ Sample ID: **L40055-01**  
Date Sampled: 09/18/17 11:05  
Date Received: 09/22/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 13:56	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 11:57	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 14:23	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:22	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 14:33	wtc

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	10/02/17 19:16	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 21:48	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0027			mg/L	0.0002	0.001	10/04/17 21:27	mfm
Barium, dissolved	M200.7 ICP	1	0.033			mg/L	0.003	0.02	10/03/17 13:08	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:16	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:16	dcm
Boron, dissolved	M200.7 ICP	1	0.08			mg/L	0.01	0.05	10/02/17 19:16	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:27	mfm
Calcium, dissolved	M200.7 ICP	1	189			mg/L	0.1	0.5	10/02/17 19:16	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:16	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:16	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:16	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:16	dcm
Iron, dissolved	M200.7 ICP	1	4.58			mg/L	0.02	0.05	10/03/17 13:08	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:27	mfm
Lithium, dissolved	M200.7 ICP	1	0.079			mg/L	0.008	0.04	10/02/17 19:16	dcm
Magnesium, dissolved	M200.7 ICP	1	35.5			mg/L	0.2	1	10/02/17 19:16	dcm
Manganese, dissolved	M200.7 ICP	1	0.075			mg/L	0.005	0.03	10/02/17 19:16	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 10:53	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:16	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:16	dcm
Potassium, dissolved	M200.7 ICP	1	4.6			mg/L	0.2	1	10/02/17 19:16	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:16	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	10/04/17 21:27	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:27	mfm
Sodium, dissolved	M200.7 ICP	1	47.2			mg/L	0.2	1	10/02/17 19:16	dcm
Strontium, dissolved	M200.7 ICP	1	1.87			mg/L	0.005	0.03	10/02/17 19:16	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:27	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:16	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:16	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	10/04/17 21:27	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:16	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:16	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: PSA-1

ACZ Sample ID: **L40055-01**  
 Date Sampled: 09/18/17 11:05  
 Date Received: 09/22/17  
 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	151		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	151		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			10/19/17 0:00	calc
Sum of Anions			15			meq/L			10/19/17 0:00	calc
Sum of Cations			15			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	44.2		*	mg/L	0.5	2	09/29/17 11:38	jmm
Conductivity @25C	SM2510B	1	1280		*	umhos/cm	1	10	09/29/17 2:21	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:15	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:25	wtc
Fluoride	SM4500F-C	1	2.33		*	mg/L	0.05	0.3	09/27/17 16:25	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		618			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	09/30/17 17:45	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:30	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 16:47	pjb
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.8		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/10/17 14:13	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/23/17 14:42	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	10/04/17 23:17	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	902		*	mg/L	10	20	09/25/17 10:06	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	9.0	B	*	mg/L	5	20	09/25/17 14:37	che
Residue, Total (TS) @ 105C	SM2540B	1	964		*	mg/L	10	20	09/25/17 11:13	che
Sulfate	D516-02/-07 - Turbidimetric	25	481		*	mg/L	25	125	10/03/17 12:42	las
Sulfide as S	SM4500S2-D	1	0.02	BH	*	mg/L	0.02	0.1	09/26/17 14:43	emk
TDS (calculated)	Calculation		902			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.00						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: RW-1

ACZ Sample ID: **L40055-02**  
Date Sampled: 09/18/17 12:40  
Date Received: 09/22/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:03	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 12:04	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/28/17 14:30	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:27	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 14:38	wtc

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	10/02/17 19:19	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 21:50	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0002	0.001	10/04/17 21:36	mfm
Barium, dissolved	M200.7 ICP	1	0.092			mg/L	0.003	0.02	10/03/17 13:11	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:19	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:19	dcm
Boron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	10/02/17 19:19	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:36	mfm
Calcium, dissolved	M200.7 ICP	1	57.0			mg/L	0.1	0.5	10/02/17 19:19	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:19	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:19	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:19	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:19	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	10/03/17 13:11	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	10/04/17 21:36	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:19	dcm
Magnesium, dissolved	M200.7 ICP	1	10.9			mg/L	0.2	1	10/02/17 19:19	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:19	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:08	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:19	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:19	dcm
Potassium, dissolved	M200.7 ICP	1	6.4			mg/L	0.2	1	10/02/17 19:19	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:19	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	10/04/17 21:36	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:36	mfm
Sodium, dissolved	M200.7 ICP	1	19.5			mg/L	0.2	1	10/02/17 19:19	dcm
Strontium, dissolved	M200.7 ICP	1	0.418			mg/L	0.005	0.03	10/02/17 19:19	dcm
Thallium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 21:36	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:19	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:19	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	10/04/17 21:36	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:19	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:19	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: RW-1

ACZ Sample ID: **L40055-02**  
 Date Sampled: 09/18/17 12:40  
 Date Received: 09/22/17  
 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	90.7		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	90.7		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			4.3			%			10/19/17 0:00	calc
Sum of Anions			4.4			meq/L			10/19/17 0:00	calc
Sum of Cations			4.8			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	8.2		*	mg/L	0.5	2	09/29/17 11:39	jmm
Conductivity @25C	SM2510B	1	491		*	umhos/cm	1	10	09/29/17 2:30	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:16	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 17:28	wtc
Fluoride	SM4500F-C	1	0.35		*	mg/L	0.05	0.3	09/27/17 16:28	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		187			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	4	6.36		*	mg/L	0.08	0.4	09/30/17 18:17	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:32	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	09/30/17 16:48	pjb
pH (lab)	SM4500H+ B									
pH		1	7.8	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.8		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/10/17 14:14	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	09/23/17 14:43	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	10/04/17 23:18	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	348		*	mg/L	10	20	09/25/17 10:09	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	34.0		*	mg/L	5	20	09/25/17 14:39	che
Residue, Total (TS) @ 105C	SM2540B	1	400		*	mg/L	10	20	09/25/17 11:14	che
Sulfate	D516-02/-07 - Turbidimetric	5	112		*	mg/L	5	25	10/03/17 12:17	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 14:46	emk
TDS (calculated)	Calculation		270			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.29						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-3

ACZ Sample ID: **L40055-03**  
Date Sampled: 09/18/17 09:55  
Date Received: 09/22/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:10	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 12:12	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor								09/28/17 14:38	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:32	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 14:43	wtc

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	10/02/17 19:28	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0006	B		mg/L	0.0004	0.002	10/05/17 21:57	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0021			mg/L	0.0002	0.001	10/04/17 21:39	mfm
Barium, dissolved	M200.7 ICP	1	0.043			mg/L	0.003	0.02	10/03/17 13:20	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:28	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:28	dcm
Boron, dissolved	M200.7 ICP	1	0.05			mg/L	0.01	0.05	10/02/17 19:28	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:39	mfm
Calcium, dissolved	M200.7 ICP	1	82.6			mg/L	0.1	0.5	10/02/17 19:28	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:28	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:28	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:28	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:28	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	10/03/17 13:20	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 21:39	mfm
Lithium, dissolved	M200.7 ICP	1	0.010	B		mg/L	0.008	0.04	10/02/17 19:28	dcm
Magnesium, dissolved	M200.7 ICP	1	10.1			mg/L	0.2	1	10/02/17 19:28	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:28	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:10	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:28	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:28	dcm
Potassium, dissolved	M200.7 ICP	1	4.1			mg/L	0.2	1	10/02/17 19:28	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:28	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0003	10/04/17 21:39	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:39	mfm
Sodium, dissolved	M200.7 ICP	1	28.5			mg/L	0.2	1	10/02/17 19:28	dcm
Strontium, dissolved	M200.7 ICP	1	0.794			mg/L	0.005	0.03	10/02/17 19:28	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:39	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:28	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:28	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 21:39	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:28	dcm
Zinc, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	10/02/17 19:28	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-3

ACZ Sample ID: **L40055-03**  
 Date Sampled: 09/18/17 09:55  
 Date Received: 09/22/17  
 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	83.6		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	83.6		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.8			%			10/19/17 0:00	calc
Sum of Anions			6.2			meq/L			10/19/17 0:00	calc
Sum of Cations			6.3			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	18.3		*	mg/L	0.5	2	09/29/17 11:44	jmm
Conductivity @25C	SM2510B	1	638		*	umhos/cm	1	10	09/29/17 2:39	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:17	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:28	wtc
Fluoride	SM4500F-C	1	0.70		*	mg/L	0.05	0.3	09/27/17 16:32	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		248			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.57		*	mg/L	0.02	0.1	09/30/17 17:47	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:33	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	1		U	*	mg/L	0.1	0.5	09/30/17 16:50	pjb
pH (lab)	SM4500H+ B									
pH		1	7.7	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.8		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.25			mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.08		*	mg/L	0.02	0.05	10/14/17 1:08	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.09	H	*	mg/L	0.02	0.05	09/23/17 14:47	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.08		*	mg/L	0.02	0.05	10/04/17 23:20	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	486		*	mg/L	10	20	09/25/17 10:12	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/25/17 14:42	che
Residue, Total (TS) @ 105C	SM2540B	1	508		*	mg/L	10	20	09/25/17 11:15	che
Sulfate	D516-02/-07 - Turbidimetric	5	187		*	mg/L	5	25	10/03/17 12:17	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 14:49	emk
TDS (calculated)	Calculation		383			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.27						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-4

ACZ Sample ID: **L40055-04**

Date Sampled: 09/18/17 11:00

Date Received: 09/22/17

Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:18	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 12:19	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 14:45	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:37	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 14:54	wtc

**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	10/02/17 19:37	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 21:59	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0023			mg/L	0.0002	0.001	10/04/17 21:43	mfm
Barium, dissolved	M200.7 ICP	1	0.028			mg/L	0.003	0.02	10/03/17 13:28	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:37	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:37	dcm
Boron, dissolved	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	10/02/17 19:37	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:43	mfm
Calcium, dissolved	M200.7 ICP	1	70.2			mg/L	0.1	0.5	10/02/17 19:37	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:37	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:37	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:37	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:37	dcm
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	10/03/17 13:28	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	10/04/17 21:43	mfm
Lithium, dissolved	M200.7 ICP	1	0.009	B		mg/L	0.008	0.04	10/02/17 19:37	dcm
Magnesium, dissolved	M200.7 ICP	1	7.8			mg/L	0.2	1	10/02/17 19:37	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:37	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:11	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:37	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:37	dcm
Potassium, dissolved	M200.7 ICP	1	4.0			mg/L	0.2	1	10/02/17 19:37	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:37	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0003	10/04/17 21:43	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:43	mfm
Sodium, dissolved	M200.7 ICP	1	25.5			mg/L	0.2	1	10/02/17 19:37	dcm
Strontium, dissolved	M200.7 ICP	1	0.648			mg/L	0.005	0.03	10/02/17 19:37	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:43	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:37	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:37	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 21:43	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:37	dcm
Zinc, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	10/02/17 19:37	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-4

ACZ Sample ID: **L40055-04**  
 Date Sampled: 09/18/17 11:00  
 Date Received: 09/22/17  
 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	86.3		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	86.3		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			1.9			%			10/19/17 0:00	calc
Sum of Anions			5.2			meq/L			10/19/17 0:00	calc
Sum of Cations			5.4			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	13.9		*	mg/L	0.5	2	09/29/17 11:44	jmm
Conductivity @25C	SM2510B	1	564		*	umhos/cm	1	10	09/29/17 2:47	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:18	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 17:37	wtc
Fluoride	SM4500F-C	1	0.80		*	mg/L	0.05	0.3	09/27/17 16:35	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		207			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.50		*	mg/L	0.02	0.1	09/30/17 17:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:35	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 16:51	pjb
pH (lab)	SM4500H+ B									
pH		1	7.7	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.5		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.19	B		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.06		*	mg/L	0.02	0.05	10/10/17 14:16	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.08	H	*	mg/L	0.02	0.05	09/23/17 14:48	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.07		*	mg/L	0.02	0.05	10/04/17 23:22	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	412		*	mg/L	10	20	09/25/17 10:14	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	6.0	B	*	mg/L	5	20	09/25/17 14:44	che
Residue, Total (TS) @ 105C	SM2540B	1	456		*	mg/L	10	20	09/25/17 11:16	che
Sulfate	D516-02/-07 - Turbidimetric	5	144		*	mg/L	5	25	10/03/17 12:18	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 14:58	emk
TDS (calculated)	Calculation		320			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.29						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-5

ACZ Sample ID: **L40055-05**  
Date Sampled: 09/18/17 09:23  
Date Received: 09/21/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:25	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 12:26	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 15:08	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:42	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:06	wtc

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	10/02/17 19:40	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0005	B		mg/L	0.0004	0.002	10/05/17 22:05	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0008	B		mg/L	0.0002	0.001	10/04/17 21:52	mfm
Barium, dissolved	M200.7 ICP	1	0.050			mg/L	0.003	0.02	10/03/17 13:31	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:40	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:40	dcm
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	10/02/17 19:40	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:52	mfm
Calcium, dissolved	M200.7 ICP	1	128			mg/L	0.1	0.5	10/02/17 19:40	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:40	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:40	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:40	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:40	dcm
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	10/03/17 13:31	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	10/04/17 21:52	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:40	dcm
Magnesium, dissolved	M200.7 ICP	1	17.0			mg/L	0.2	1	10/02/17 19:40	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:40	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:12	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:40	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:40	dcm
Potassium, dissolved	M200.7 ICP	1	8.0			mg/L	0.2	1	10/02/17 19:40	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:40	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0003	10/04/17 21:52	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:52	mfm
Sodium, dissolved	M200.7 ICP	1	28.6			mg/L	0.2	1	10/02/17 19:40	dcm
Strontium, dissolved	M200.7 ICP	1	0.504			mg/L	0.005	0.03	10/02/17 19:40	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:52	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:40	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:40	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	10/04/17 21:52	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:40	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:40	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-5

ACZ Sample ID: **L40055-05**  
Date Sampled: 09/18/17 09:23  
Date Received: 09/21/17  
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	93.6		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	93.6		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.8			%			10/19/17 0:00	calc
Sum of Anions			8.8			meq/L			10/19/17 0:00	calc
Sum of Cations			9.3			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	22.9		*	mg/L	0.5	2	09/29/17 11:44	jmm
Conductivity @25C	SM2510B	1	896		*	umhos/cm	1	10	09/29/17 3:04	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:19	wtc
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:30	wtc
Fluoride	SM4500F-C	1	0.23	B	*	mg/L	0.05	0.3	09/27/17 16:39	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		390			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	4	6.85		*	mg/L	0.08	0.4	09/30/17 18:18	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:39	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 16:54	pjb
pH (lab)	SM4500H+ B									
pH		1	7.5	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.4		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	10/10/17 14:18	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.04	BH	*	mg/L	0.02	0.05	09/23/17 14:49	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/05/17 0:13	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	684		*	mg/L	10	20	09/25/17 10:17	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	5.0	B	*	mg/L	5	20	09/25/17 14:46	che
Residue, Total (TS) @ 105C	SM2540B	1	702		*	mg/L	10	20	09/25/17 11:17	che
Sulfate	D516-02/-07 - Turbidimetric	10	300		*	mg/L	10	50	10/03/17 12:32	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 15:08	emk
TDS (calculated)	Calculation		562			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.22						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-6

ACZ Sample ID: **L40055-06**  
Date Sampled: 09/18/17 08:00  
Date Received: 09/21/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:32	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 12:33	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 15:15	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:46	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:17	wtc

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	10/02/17 19:43	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 22:07	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0022			mg/L	0.0002	0.001	10/04/17 21:55	mfm
Barium, dissolved	M200.7 ICP	1	0.146			mg/L	0.003	0.02	10/03/17 13:35	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:43	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:43	dcm
Boron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.01	0.05	10/02/17 19:43	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:55	mfm
Calcium, dissolved	M200.7 ICP	1	185			mg/L	0.1	0.5	10/02/17 19:43	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:43	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:43	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:43	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:43	dcm
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	10/03/17 13:35	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:55	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:43	dcm
Magnesium, dissolved	M200.7 ICP	1	19.4			mg/L	0.2	1	10/02/17 19:43	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:43	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:25	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:43	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:43	dcm
Potassium, dissolved	M200.7 ICP	1	8.9			mg/L	0.2	1	10/02/17 19:43	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:43	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0009			mg/L	0.0001	0.0003	10/04/17 21:55	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:55	mfm
Sodium, dissolved	M200.7 ICP	1	33.3			mg/L	0.2	1	10/02/17 19:43	dcm
Strontium, dissolved	M200.7 ICP	1	0.955			mg/L	0.005	0.03	10/02/17 19:43	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:55	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:43	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:43	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0006			mg/L	0.0001	0.0005	10/04/17 21:55	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:43	dcm
Zinc, dissolved	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	10/02/17 19:43	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-6

ACZ Sample ID: **L40055-06**  
 Date Sampled: 09/18/17 08:00  
 Date Received: 09/21/17  
 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	105		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	105		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			8.3			%			10/19/17 0:00	calc
Sum of Anions			11			meq/L			10/19/17 0:00	calc
Sum of Cations			13			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	29.4		*	mg/L	0.5	2	09/29/17 11:44	jmm
Conductivity @25C	SM2510B	1	1190		*	umhos/cm	1	10	09/29/17 3:13	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:20	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:31	wtc
Fluoride	SM4500F-C	1	0.12	B	*	mg/L	0.05	0.3	09/27/17 16:54	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		542			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	10	20.1		*	mg/L	0.2	1	09/30/17 18:19	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:41	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 16:55	pjb
pH (lab)	SM4500H+ B									
pH		1	7.4	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.6		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.09	B		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	10/10/17 14:19	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	09/23/17 14:50	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/04/17 23:44	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	902		*	mg/L	10	20	09/25/17 11:41	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/25/17 14:47	che
Residue, Total (TS) @ 105C	SM2540B	1	954		*	mg/L	10	20	09/25/17 11:24	che
Sulfate	D516-02/-07 - Turbidimetric	25	399		*	mg/L	25	125	10/03/17 12:42	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 15:11	emk
TDS (calculated)	Calculation		740			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.22						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-11

ACZ Sample ID: **L40055-07**  
Date Sampled: 09/18/17 10:20  
Date Received: 09/21/17  
Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:39	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 12:40	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 15:23	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 15:51	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:22	wtc

**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	10/02/17 19:46	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 22:09	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0027			mg/L	0.0002	0.001	10/04/17 21:58	mfm
Barium, dissolved	M200.7 ICP	1	0.028			mg/L	0.003	0.02	10/03/17 13:38	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:46	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:46	dcm
Boron, dissolved	M200.7 ICP	1	0.16			mg/L	0.01	0.05	10/02/17 19:46	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:58	mfm
Calcium, dissolved	M200.7 ICP	1	231			mg/L	0.1	0.5	10/02/17 19:46	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:46	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:46	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:46	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:46	dcm
Iron, dissolved	M200.7 ICP	1	1.11		*	mg/L	0.02	0.05	10/03/17 13:38	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:58	mfm
Lithium, dissolved	M200.7 ICP	1	0.073			mg/L	0.008	0.04	10/02/17 19:46	dcm
Magnesium, dissolved	M200.7 ICP	1	34.6			mg/L	0.2	1	10/02/17 19:46	dcm
Manganese, dissolved	M200.7 ICP	1	0.017	B		mg/L	0.005	0.03	10/02/17 19:46	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:26	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:46	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:46	dcm
Potassium, dissolved	M200.7 ICP	1	4.4			mg/L	0.2	1	10/02/17 19:46	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:46	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	10/04/17 21:58	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 21:58	mfm
Sodium, dissolved	M200.7 ICP	1	68.5			mg/L	0.2	1	10/02/17 19:46	dcm
Strontium, dissolved	M200.7 ICP	1	2.2			mg/L	0.005	0.03	10/02/17 19:46	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 21:58	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:46	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:46	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0004	B		mg/L	0.0001	0.0005	10/04/17 21:58	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:46	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:46	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-11

ACZ Sample ID: **L40055-07**  
 Date Sampled: 09/18/17 10:20  
 Date Received: 09/21/17  
 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	138		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	138		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			10/19/17 0:00	calc
Sum of Anions			18			meq/L			10/19/17 0:00	calc
Sum of Cations			18			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	60.5		*	mg/L	0.5	2	09/29/17 11:44	jmm
Conductivity @25C	SM2510B	1	1540		*	umhos/cm	1	10	09/29/17 3:22	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:21	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:31	wtc
Fluoride	SM4500F-C	1	2.42		*	mg/L	0.05	0.3	09/27/17 17:04	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		719			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	09/30/17 17:54	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:42	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 16:58	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.4		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/10/17 14:20	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/23/17 14:51	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/04/17 23:45	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	1190		*	mg/L	10	20	09/25/17 11:44	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/25/17 14:49	che
Residue, Total (TS) @ 105C	SM2540B	1	1200		*	mg/L	10	20	09/25/17 11:26	che
Sulfate	D516-02/-07 - Turbidimetric	25	621		*	mg/L	25	125	10/03/17 12:42	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 15:14	emk
TDS (calculated)	Calculation		1110			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.07						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-7

ACZ Sample ID: **L40055-09**  
Date Sampled: 09/18/17 07:10  
Date Received: 09/22/17  
Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 14:54	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 13:09	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 15:37	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 16:01	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:33	wtc

**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	10/02/17 19:52	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	10/05/17 22:13	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0024			mg/L	0.0002	0.001	10/04/17 22:04	mfm
Barium, dissolved	M200.7 ICP	1	0.402			mg/L	0.003	0.02	10/03/17 13:44	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:52	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:52	dcm
Boron, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:52	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:04	mfm
Calcium, dissolved	M200.7 ICP	1	28.1			mg/L	0.1	0.5	10/02/17 19:52	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:52	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:52	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:52	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:52	dcm
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	10/03/17 13:44	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0005	10/04/17 22:04	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:52	dcm
Magnesium, dissolved	M200.7 ICP	1	9.2			mg/L	0.2	1	10/02/17 19:52	dcm
Manganese, dissolved	M200.7 ICP	1	0.020	B		mg/L	0.005	0.03	10/02/17 19:52	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:30	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:52	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:52	dcm
Potassium, dissolved	M200.7 ICP	1	8.1			mg/L	0.2	1	10/02/17 19:52	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:52	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	10/04/17 22:04	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 22:04	mfm
Sodium, dissolved	M200.7 ICP	1	17.0			mg/L	0.2	1	10/02/17 19:52	dcm
Strontium, dissolved	M200.7 ICP	1	0.189			mg/L	0.005	0.03	10/02/17 19:52	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:04	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:52	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:52	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:04	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:52	dcm
Zinc, dissolved	M200.7 ICP	1	0.30			mg/L	0.01	0.05	10/02/17 19:52	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-7

ACZ Sample ID: **L40055-09**  
 Date Sampled: 09/18/17 07:10  
 Date Received: 09/22/17  
 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	101		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	101		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			3.3			%			10/19/17 0:00	calc
Sum of Anions			2.9			meq/L			10/19/17 0:00	calc
Sum of Cations			3.1			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	13.9		*	mg/L	0.5	2	09/29/17 11:44	jmm
Conductivity @25C	SM2510B	1	328		*	umhos/cm	1	10	09/29/17 3:39	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:24	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:35	wtc
Fluoride	SM4500F-C	1	0.13	B	*	mg/L	0.05	0.3	09/27/17 17:14	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		108			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	2.98		*	mg/L	0.02	0.1	09/30/17 18:03	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:46	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 17:01	pjb
pH (lab)	SM4500H+ B									
pH		1	7.7	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.4		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/10/17 14:22	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	09/23/17 14:56	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.03	B	*	mg/L	0.02	0.05	10/04/17 23:47	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	258		*	mg/L	10	20	09/25/17 11:49	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	11.0	B	*	mg/L	5	20	09/25/17 14:52	che
Residue, Total (TS) @105C	SM2540B	1	272		*	mg/L	10	20	09/25/17 11:31	che
Sulfate	D516-02/-07 - Turbidimetric	1	24.2		*	mg/L	1	5	10/03/17 12:11	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 15:20	emk
TDS (calculated)	Calculation		163			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.58						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-8

ACZ Sample ID: **L40055-10**  
Date Sampled: 09/18/17 08:55  
Date Received: 09/22/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 15:01	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 13:16	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 15:45	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 16:06	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:39	wtc

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	10/02/17 19:55	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0008	B		mg/L	0.0004	0.002	10/05/17 22:15	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0012			mg/L	0.0002	0.001	10/04/17 22:08	mfm
Barium, dissolved	M200.7 ICP	1	0.077			mg/L	0.003	0.02	10/03/17 13:47	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:55	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 19:55	dcm
Boron, dissolved	M200.7 ICP	1	0.01	B		mg/L	0.01	0.05	10/02/17 19:55	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:08	mfm
Calcium, dissolved	M200.7 ICP	1	114			mg/L	0.1	0.5	10/02/17 19:55	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:55	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:55	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:55	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:55	dcm
Iron, dissolved	M200.7 ICP	1		U	*	mg/L	0.02	0.05	10/03/17 13:47	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 22:08	mfm
Lithium, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:55	dcm
Magnesium, dissolved	M200.7 ICP	1	17.9			mg/L	0.2	1	10/02/17 19:55	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:55	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:33	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 19:55	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 19:55	dcm
Potassium, dissolved	M200.7 ICP	1	7.0			mg/L	0.2	1	10/02/17 19:55	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 19:55	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0003	10/04/17 22:08	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 22:08	mfm
Sodium, dissolved	M200.7 ICP	1	26.1			mg/L	0.2	1	10/02/17 19:55	dcm
Strontium, dissolved	M200.7 ICP	1	0.435			mg/L	0.005	0.03	10/02/17 19:55	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:08	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 19:55	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:55	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	10/04/17 22:08	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 19:55	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 19:55	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-8

ACZ Sample ID: **L40055-10**  
Date Sampled: 09/18/17 08:55  
Date Received: 09/22/17  
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	83.2		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	83.2		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			1.2			%			10/19/17 0:00	calc
Sum of Anions			8.3			meq/L			10/19/17 0:00	calc
Sum of Cations			8.5			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	23.4		*	mg/L	0.5	2	09/29/17 11:45	jmm
Conductivity @25C	SM2510B	1	850		*	umhos/cm	1	10	09/29/17 3:48	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:25	wtc
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 16:36	wtc
Fluoride	SM4500F-C	1	0.15	B	*	mg/L	0.05	0.3	09/27/17 17:18	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		358			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	3	5.76		*	mg/L	0.06	0.3	09/30/17 18:21	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:49	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 17:02	pjb
pH (lab)	SM4500H+ B									
pH		1	7.7	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.8		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/10/17 14:26	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.05	H	*	mg/L	0.02	0.05	09/23/17 15:00	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.05		*	mg/L	0.02	0.05	10/04/17 23:51	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	642		*	mg/L	10	20	09/25/17 11:52	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	8.0	B	*	mg/L	5	20	09/25/17 14:54	che
Residue, Total (TS) @105C	SM2540B	1	676		*	mg/L	10	20	09/25/17 11:33	che
Sulfate	D516-02/-07 - Turbidimetric	10	286		*	mg/L	10	50	10/03/17 12:52	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/26/17 15:23	emk
TDS (calculated)	Calculation		526			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.22						10/19/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-9

ACZ Sample ID: **L40055-11**  
 Date Sampled: 09/18/17 11:40  
 Date Received: 09/22/17  
 Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 15:08	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 13:24	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 15:52	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/09/17 16:10	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:44	wtc

**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	10/02/17 20:04	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 22:17	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0006	B		mg/L	0.0002	0.001	10/04/17 22:11	mfm
Barium, dissolved	M200.7 ICP	1	0.060			mg/L	0.003	0.02	10/03/17 13:56	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:04	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 20:04	dcm
Boron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	10/02/17 20:04	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:11	mfm
Calcium, dissolved	M200.7 ICP	1	71.7			mg/L	0.1	0.5	10/02/17 20:04	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:04	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:04	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:04	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 20:04	dcm
Iron, dissolved	M200.7 ICP	1	6.01		*	mg/L	0.02	0.05	10/03/17 13:56	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 22:11	mfm
Lithium, dissolved	M200.7 ICP	1	0.013	B		mg/L	0.008	0.04	10/02/17 20:04	dcm
Magnesium, dissolved	M200.7 ICP	1	11.1			mg/L	0.2	1	10/02/17 20:04	dcm
Manganese, dissolved	M200.7 ICP	1	0.206			mg/L	0.005	0.03	10/02/17 20:04	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:33	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 20:04	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 20:04	dcm
Potassium, dissolved	M200.7 ICP	1	5.0			mg/L	0.2	1	10/02/17 20:04	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 20:04	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	10/04/17 22:11	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 22:11	mfm
Sodium, dissolved	M200.7 ICP	1	27.7			mg/L	0.2	1	10/02/17 20:04	dcm
Strontium, dissolved	M200.7 ICP	1	0.538			mg/L	0.005	0.03	10/02/17 20:04	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:11	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 20:04	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 20:04	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:11	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 20:04	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:04	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-9

ACZ Sample ID: **L40055-11**  
Date Sampled: 09/18/17 11:40  
Date Received: 09/22/17  
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	139		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	139		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.5			%			10/19/17 0:00	calc
Sum of Anions			5.9			meq/L			10/19/17 0:00	calc
Sum of Cations			6.2			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	13.9		*	mg/L	0.5	2	09/29/17 11:54	jmm
Conductivity @25C	SM2510B	1	578		*	umhos/cm	1	10	09/29/17 3:57	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:26	wtc
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 17:28	wtc
Fluoride	SM4500F-C	1	0.84		*	mg/L	0.05	0.3	09/27/17 17:21	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		225			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	09/30/17 18:05	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:51	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 17:03	pjb
pH (lab)	SM4500H+ B									
pH		1	8.0	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.5		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/10/17 14:27	las
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/23/17 15:01	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/04/17 23:52	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	414		*	mg/L	10	20	09/25/17 11:54	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	28.0		*	mg/L	5	20	09/25/17 14:56	che
Residue, Total (TS) @ 105C	SM2540B	1	450		*	mg/L	10	20	09/25/17 11:35	che
Sulfate	D516-02/-07 - Turbidimetric	5	129		*	mg/L	5	25	10/03/17 12:43	las
Sulfide as S	SM4500S2-D	1	0.07	BH	*	mg/L	0.02	0.1	09/26/17 15:27	emk
TDS (calculated)	Calculation		351			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.18						10/19/17 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: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-01	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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).
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432800	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).
	WG431984	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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).
	WG432009	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-02	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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).
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432510	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).
	WG432733	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).
	WG432509	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
			pH measured at	SM4500H+ B	Q6
	WG433191	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).
	WG431963	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).
	WG432800	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).
	WG431984	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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).
	WG432009	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			SM4500S2-D	Q6	Sample was received above recommended temperature.
			SM4500S2-D	QD	Reported value is the background-corrected concentration,

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-03	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432510	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).
	WG432733	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).
	WG432509	Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433564	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).
	WG431963	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).
	WG432800	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).
	WG431984	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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).
	WG432009	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	sample is too low for accurate evaluation (< 10x MDL). Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-04	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		M351.2 - TKN by Block Digester	Q6	Sample was received above recommended temperature.
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432800	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).
	WG431984	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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).
	WG432009	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-05	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		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).
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432802	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG431984	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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).
	WG432009	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-06	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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.
			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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		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).
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432802	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG432013	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG432011	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-07	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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.
			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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		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).
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432802	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG432013	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG432011	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-09	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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.
			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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		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).
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432802	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG432013	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG432011	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	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.
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-10	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG432611	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).
	WG432600	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).
	WG432220	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.
			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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		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).
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432802	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG432013	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.
	WG432042	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

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					sample is too low for accurate evaluation (< 10x MDL).
	WG432011	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432668	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.
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG432139	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG432378	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-11	WG432378	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432388	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.
	WG432378	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
			SM2510B	ZW	Method deviation. The sample was centrifuged prior to analysis due to high solid content.
	WG432611	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).
	WG432600	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).
	WG432220	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.
			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).
	WG432378	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432639	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.
	WG432510	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).
	WG432733	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).
	WG432310	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432509		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).
	WG432378	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
			SM4500H+ B	ZW	Method deviation. The sample was centrifuged prior to analysis due to high solid content.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG433191	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).
	WG431963	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).
	WG432802	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	Q6	Sample was received above recommended temperature.
	WG432013	Residue, Filterable (TDS) @180C	SM2540C	Q6	Sample was received above recommended temperature.

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Tahoe Resources, Inc.

ACZ Project ID: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
WG432042		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).
WG432011		Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
WG432668		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.
			D516-02/-07 - Turbidimetric	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
WG432139		Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
WG432378		Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.
			SM2320B - Titration	ZW	Method deviation. The sample was centrifuged prior to analysis due to high solid content.



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: PSA-1

ACZ Sample ID: **L40055-01**  
Date Sampled: 09/18/17 11:05  
Date Received: 09/22/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG432526**

Analyst: jmm  
Extract Date: 09/25/17 13:00  
Analysis Date: 10/02/17 14:49

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.94	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	69.5		0.94	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: RW-1

ACZ Sample ID: **L40055-02**  
Date Sampled: 09/18/17 12:40  
Date Received: 09/22/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG432526**

Analyst: jmm  
Extract Date: 09/25/17 13:06  
Analysis Date: 10/02/17 15:12

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	67.5		0.95	*	%	60	120

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: MW-3ACZ Sample ID: **L40055-03**  
Date Sampled: 09/18/17 9:55  
Date Received: 09/22/17  
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG432526Analyst: jmm  
Extract Date: 09/25/17 13:12  
Analysis Date: 10/02/17 15:59

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.29	J	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	64.2		0.93	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-4

ACZ Sample ID: **L40055-04**  
Date Sampled: 09/18/17 11:00  
Date Received: 09/22/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG432526**

Analyst: jmm  
Extract Date: 09/25/17 13:17  
Analysis Date: 10/02/17 16:22

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.3	J	0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	66		0.95	*	%	60	120

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: MW-5ACZ Sample ID: **L40055-05**  
Date Sampled: 09/18/17 9:23  
Date Received: 09/21/17  
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG432526Analyst: jmm  
Extract Date: 09/25/17 13:23  
Analysis Date: 10/02/17 16:46

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.3	J	0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	62.2		0.95	*	%	60	120

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: MW-6ACZ Sample ID: **L40055-06**  
Date Sampled: 09/18/17 8:00  
Date Received: 09/21/17  
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG432526Analyst: jmm  
Extract Date: 09/25/17 13:29  
Analysis Date: 10/02/17 17:09

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.3	J	0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	63.4		0.95	*	%	60	120



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-11

ACZ Sample ID: **L40055-07**  
Date Sampled: 09/18/17 10:20  
Date Received: 09/21/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG432526**

Analyst: jmm  
Extract Date: 09/25/17 13:35  
Analysis Date: 10/02/17 17:33

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	69.1		0.93	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: MW-7

ACZ Sample ID: **L40055-09**

Date Sampled: 09/18/17 7:10

Date Received: 09/22/17

Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**Extract Method: **M3520****Workgroup:** WG432526

Analyst: jmm

Extract Date: 09/25/17 13:46

Analysis Date: 10/02/17 18:19

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.3	J	0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	65.8		0.95	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-8

ACZ Sample ID: **L40055-10**  
Date Sampled: 09/18/17 8:55  
Date Received: 09/22/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG432526**

Analyst: jmm  
Extract Date: 09/25/17 13:52  
Analysis Date: 10/02/17 18:43

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	70.2		0.93	*	%	60	120

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: MW-9ACZ Sample ID: **L40055-11**  
Date Sampled: 09/18/17 11:40  
Date Received: 09/22/17  
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup: WG432526**Analyst: jmm  
Extract Date: 09/25/17 13:57  
Analysis Date: 10/02/17 19:06

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28		0.8		0.95	*	mg/L	0.1	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	480.1		0.95	*	%	60	120

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: MW-21

ACZ Sample ID: **L40055-12**  
Date Sampled: 09/18/17 11:40  
Date Received: 09/22/17  
Sample Matrix: Ground Water

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								10/02/17 15:22	wtc
Cyanide, WAD	SM4500-CN I- distillation								10/02/17 13:31	las
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/28/17 16:00	las
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								10/13/17 12:09	las
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								10/04/17 13:49	wtc

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	10/02/17 20:07	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/05/17 22:19	mfm
Arsenic, dissolved	M200.8 ICP-MS	1	0.0006	B		mg/L	0.0002	0.001	10/04/17 22:14	mfm
Barium, dissolved	M200.7 ICP	1	0.060			mg/L	0.003	0.02	10/03/17 13:59	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:07	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	10/02/17 20:07	dcm
Boron, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	10/02/17 20:07	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:14	mfm
Calcium, dissolved	M200.7 ICP	1	71.8			mg/L	0.1	0.5	10/02/17 20:07	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:07	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:07	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:07	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 20:07	dcm
Iron, dissolved	M200.7 ICP	1	6.01		*	mg/L	0.02	0.05	10/03/17 13:59	dcm
Lead, dissolved	M200.8 ICP-MS	1	0.0001	B		mg/L	0.0001	0.0005	10/04/17 22:14	mfm
Lithium, dissolved	M200.7 ICP	1	0.014	B		mg/L	0.008	0.04	10/02/17 20:07	dcm
Magnesium, dissolved	M200.7 ICP	1	11.1			mg/L	0.2	1	10/02/17 20:07	dcm
Manganese, dissolved	M200.7 ICP	1	0.209			mg/L	0.005	0.03	10/02/17 20:07	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	10/06/17 11:34	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	10/02/17 20:07	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	10/02/17 20:07	dcm
Potassium, dissolved	M200.7 ICP	1	4.9			mg/L	0.2	1	10/02/17 20:07	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	10/02/17 20:07	dcm
Selenium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0003	10/04/17 22:14	mfm
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	10/04/17 22:14	mfm
Sodium, dissolved	M200.7 ICP	1	27.6			mg/L	0.2	1	10/02/17 20:07	dcm
Strontium, dissolved	M200.7 ICP	1	0.537			mg/L	0.005	0.03	10/02/17 20:07	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:14	mfm
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	10/02/17 20:07	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 20:07	dcm
Uranium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	10/04/17 22:14	mfm
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	10/02/17 20:07	dcm
Zinc, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	10/02/17 20:07	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: MW-21

ACZ Sample ID: **L40055-12**  
 Date Sampled: 09/18/17 11:40  
 Date Received: 09/22/17  
 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	139		*	mg/L	2	20	09/29/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/29/17 0:00	emk
Total Alkalinity		1	139		*	mg/L	2	20	09/29/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			2.5			%			10/19/17 0:00	calc
Sum of Anions			5.9			meq/L			10/19/17 0:00	calc
Sum of Cations			6.2			meq/L			10/19/17 0:00	calc
Chloride	SM4500Cl-E	1	14.1		*	mg/L	0.5	2	09/29/17 11:45	jmm
Conductivity @25C	SM2510B	1	577		*	umhos/cm	1	10	09/29/17 4:06	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 18:27	wtc
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	10/02/17 17:29	wtc
Fluoride	SM4500F-C	1	0.86		*	mg/L	0.05	0.3	09/27/17 17:25	enb
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		225			mg/L	0.2	5	10/19/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1		U	*	mg/L	0.02	0.1	09/30/17 18:07	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/04/17 12:52	las
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/30/17 17:04	pjb
pH (lab)	SM4500H+ B									
pH		1	8.1	H	*	units	0.1	0.1	09/29/17 0:00	emk
pH measured at		1	20.7		*	C	0.1	0.1	09/29/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.06	B		mg/L	0.06	0.2	10/19/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.02	B	*	mg/L	0.02	0.05	10/14/17 1:11	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/23/17 15:03	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/04/17 23:53	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	398		*	mg/L	10	20	09/25/17 11:57	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1	30.0		*	mg/L	5	20	09/25/17 14:58	che
Residue, Total (TS) @ 105C	SM2540B	1	430		*	mg/L	10	20	09/25/17 11:37	che
Sulfate	D516-02/-07 - Turbidimetric	5	127		*	mg/L	5	25	10/03/17 12:44	las
Sulfide as S	SM4500S2-D	1	0.08	BH	*	mg/L	0.02	0.1	09/26/17 15:36	emk
TDS (calculated)	Calculation		349			mg/L			10/19/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.14						10/19/17 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>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: **L40055**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40055-01	WG432526	*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.
L40055-02	WG432526	*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.
L40055-03	WG432526	*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.
L40055-04	WG432526	*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.
L40055-05	WG432526	*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.
L40055-06	WG432526	*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.
L40055-07	WG432526	*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.
L40055-08	WG432526	*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.
L40055-09	WG432526	*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.
L40055-10	WG432526	*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.
L40055-11	WG432526	*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.
L40055-12	WG432526	*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.

Tahoe Resources, Inc.

ACZ Project ID: **L40055**

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: L40055  
 Date Received: 09/22/2017 09:37  
 Received By:  
 Date Printed: 9/25/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp (°C)	Temp Criteria (°C)	Rad (µR/Hr)	Custody Seal Intact?
5154	8.6	<=6.0	14	N/A
5224	15.9	<=6.0	14	Yes
5253	10.8	<=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: L40055  
Date Received: 09/22/2017 09:37  
Received By:  
Date Printed: 9/25/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).







Laboratories, Inc.

140055

CHAIN of CUSTODY

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

Report to:

Name: Luisa fernanda Barrios
Company: Minera San Rafael
E-mail: LBarrios@sanrafael.com.gt

Address: Blvd. los Proceres 18 Calle 24-69 Z 10
Empresarial, 2 Prodad, Torre W Oficina 406
Telephone: (502) 5696 4268

Copy of Report to:

Name: EvonQuednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: fbamayo@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa fernanda Barrios
Company:
E-mail:

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: EvQ 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)

Table with columns: Quote #, PO#, Reporting state, Check box, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, GW+TPH, and 10 empty columns for analyses.

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

REMARKS

COC # 2:

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 19-07-17 8:25.



Laboratories, Inc. L40055

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

CHAIN of CUSTODY

Report to:

Name: Luisa fernanda Barrios
Company: Minera San Rafael
E-mail: LBarrios@sanrafael.com.gt

Address: Blvd. los Pinos 18 Calle 24-69 Z 10
Empresarial, 2a. Avenida Torre W Oficina 1406
Telephone: (502) 5696 4268

Copy of Report to:

Name: Evon.quevedo@sanrafael.com.gt
Company: Minera San Rafael

E-mail: samayoa@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa fernanda Barrios
Company:
E-mail:

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: 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, GW + TPH, and multiple empty columns for analyses.

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

REMARKS

COC # 3

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 for Juan Aguilera and another person.



Guatemala September 18th 2017

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.

October 10, 2017

## Report to:

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

## Bill to:

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

cc: Eric von Quednow, Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L39914

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 15, 2017. This project has been assigned to ACZ's project number, L39914. 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 L39914. 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 November 09, 2017. 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: **L39914-01**

Date Sampled: 09/12/17 08:30

Date Received: 09/15/17

Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 13:27	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 12:49	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/26/17 15:29	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:08	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:42	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	1	0.07	B		mg/L	0.03	0.2	09/28/17 16:07	dcm
Antimony, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0004	0.002	10/06/17 15:48	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0061			mg/L	0.0002	0.001	09/29/17 15:46	bsu
Barium, dissolved	M200.7 ICP	1	0.128			mg/L	0.003	0.02	09/29/17 11:23	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:07	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 16:07	dcm
Boron, dissolved	M200.7 ICP	1	0.07			mg/L	0.01	0.05	09/28/17 16:07	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:46	bsu
Calcium, dissolved	M200.7 ICP	1	62.8			mg/L	0.1	0.5	09/28/17 16:07	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:07	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:07	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:07	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:07	dcm
Iron, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.05	09/28/17 16:07	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:46	bsu
Lithium, dissolved	M200.7 ICP	1	0.080			mg/L	0.008	0.04	09/28/17 16:07	dcm
Magnesium, dissolved	M200.7 ICP	1	5.3			mg/L	0.2	1	09/28/17 16:07	dcm
Manganese, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:07	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:34	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 16:07	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 16:07	dcm
Potassium, dissolved	M200.7 ICP	1	4.1			mg/L	0.2	1	09/28/17 16:07	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:07	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0003			mg/L	0.0001	0.0003	09/29/17 15:46	bsu
Silver, dissolved	M200.8 ICP-MS	1	0.00011	B		mg/L	0.00005	0.0003	09/29/17 15:46	bsu
Sodium, dissolved	M200.7 ICP	1	50.0			mg/L	0.2	1	09/28/17 16:07	dcm
Strontium, dissolved	M200.7 ICP	1	2.36		*	mg/L	0.005	0.03	09/28/17 16:07	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:46	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 16:07	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:07	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0002	B		mg/L	0.0001	0.0005	09/29/17 15:46	bsu
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:07	dcm
Zinc, dissolved	M200.7 ICP	1	0.03	B		mg/L	0.01	0.05	09/28/17 16:07	dcm



**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: HW-1

ACZ Sample ID: **L39914-01**  
 Date Sampled: 09/12/17 08:30  
 Date Received: 09/15/17  
 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	105		*	mg/L	2	20	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1	105		*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			0.0			%			10/10/17 0:00	calc
Sum of Anions			5.9			meq/L			10/10/17 0:00	calc
Sum of Cations			5.9			meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1	7.3		*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	594		*	umhos/cm	1	10	09/22/17 17:36	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:29	pjb
Cyanide, WAD	SM4500-CN I,E-Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:12	wtc
Fluoride	SM4500F-C	1	0.45		*	mg/L	0.05	0.3	09/22/17 15:38	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		179			mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	3.08		*	mg/L	0.02	0.1	09/26/17 23:49	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/03/17 11:29	wtc
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	500		U	*	mg/L	50	300	09/27/17 21:28	pjb
pH (lab)	SM4500H+ B									
pH		1	7.9	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	21.1		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus		0.12	B		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	09/28/17 0:00	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1	0.03	BH	*	mg/L	0.02	0.05	09/15/17 20:49	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1	0.04	B	*	mg/L	0.02	0.05	10/04/17 22:15	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	424		*	mg/L	10	20	09/17/17 14:12	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:52	ecc
Residue, Total (TS) @ 105C	SM2540B	1	482		*	mg/L	10	20	09/18/17 16:39	che
Sulfate	D516-02/-07 - Turbidimetric	5	172		*	mg/L	5	25	09/25/17 14:57	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/20/17 17:55	enb
TDS (calculated)	Calculation		368			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.15						10/10/17 0:00	calc

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: PSA-SR

ACZ Sample ID: **L39914-03**

Date Sampled: 09/12/17 09:50

Date Received: 09/15/17

Sample Matrix: Ground Water

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M335.4 - Manual Distillation								09/22/17 13:41	wtc
Cyanide, WAD	SM4500-CN I- distillation								09/25/17 13:04	wtc
Nitrogen, total Kjeldahl	M351.2 - Block Digestor				*				09/26/17 15:52	wtc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:18	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								09/27/17 12:51	wtc

**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	09/28/17 16:13	dcm
Antimony, dissolved	M200.8 ICP-MS	1	0.0007	B		mg/L	0.0004	0.002	10/06/17 15:52	msh
Arsenic, dissolved	M200.8 ICP-MS	1	0.0132			mg/L	0.0002	0.001	09/29/17 15:52	bsu
Barium, dissolved	M200.7 ICP	1	0.078			mg/L	0.003	0.02	09/29/17 11:29	dcm
Beryllium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:13	dcm
Bismuth, dissolved	M200.7 ICP	1		U	*	mg/L	0.04	0.2	09/28/17 16:13	dcm
Boron, dissolved	M200.7 ICP	1	0.12			mg/L	0.01	0.05	09/28/17 16:13	dcm
Cadmium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:52	bsu
Calcium, dissolved	M200.7 ICP	1	99.5			mg/L	0.1	0.5	09/28/17 16:13	dcm
Chromium, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:13	dcm
Cobalt, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:13	dcm
Copper, dissolved	M200.7 ICP	1		U		mg/L	0.01	0.05	09/28/17 16:13	dcm
Gallium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:13	dcm
Iron, dissolved	M200.7 ICP	1	0.02	B		mg/L	0.02	0.05	09/28/17 16:13	dcm
Lead, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:52	bsu
Lithium, dissolved	M200.7 ICP	1	0.150			mg/L	0.008	0.04	09/28/17 16:13	dcm
Magnesium, dissolved	M200.7 ICP	1	6.3			mg/L	0.2	1	09/28/17 16:13	dcm
Manganese, dissolved	M200.7 ICP	1	0.030			mg/L	0.005	0.03	09/28/17 16:13	dcm
Mercury, dissolved	M245.1 CVAA	1		U		mg/L	0.0002	0.001	09/21/17 19:40	sck
Molybdenum, dissolved	M200.7 ICP	1		U		mg/L	0.02	0.1	09/28/17 16:13	dcm
Nickel, dissolved	M200.7 ICP	1		U		mg/L	0.008	0.04	09/28/17 16:13	dcm
Potassium, dissolved	M200.7 ICP	1	2.0			mg/L	0.2	1	09/28/17 16:13	dcm
Scandium, dissolved	M200.7 ICP	1		U	*	mg/L	0.1	0.5	09/28/17 16:13	dcm
Selenium, dissolved	M200.8 ICP-MS	1	0.0005			mg/L	0.0001	0.0003	09/29/17 15:52	bsu
Silver, dissolved	M200.8 ICP-MS	1		U		mg/L	0.00005	0.0003	09/29/17 15:52	bsu
Sodium, dissolved	M200.7 ICP	1	84.2			mg/L	0.2	1	09/28/17 16:13	dcm
Strontium, dissolved	M200.7 ICP	1	4.51		*	mg/L	0.005	0.03	09/28/17 16:13	dcm
Thallium, dissolved	M200.8 ICP-MS	1		U		mg/L	0.0001	0.0005	09/29/17 15:52	bsu
Tin, dissolved	M200.7 ICP	1		U		mg/L	0.04	0.2	09/28/17 16:13	dcm
Titanium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:13	dcm
Uranium, dissolved	M200.8 ICP-MS	1	0.0003	B		mg/L	0.0001	0.0005	09/29/17 15:52	bsu
Vanadium, dissolved	M200.7 ICP	1		U		mg/L	0.005	0.03	09/28/17 16:13	dcm
Zinc, dissolved	M200.7 ICP	1	0.04	B		mg/L	0.01	0.05	09/28/17 16:13	dcm

**Tahoe Resources, Inc.**

Project ID: Escobal  
 Sample ID: PSA-SR

ACZ Sample ID: **L39914-03**  
 Date Sampled: 09/12/17 09:50  
 Date Received: 09/15/17  
 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	170		*	mg/L	2	20	09/22/17 0:00	emk
Carbonate as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Hydroxide as CaCO3		1		U	*	mg/L	2	20	09/22/17 0:00	emk
Total Alkalinity		1	170		*	mg/L	2	20	09/22/17 0:00	emk
Cation-Anion Balance	Calculation									
Cation-Anion Balance			-0.5			%			10/10/17 0:00	calc
Sum of Anions			9.5			meq/L			10/10/17 0:00	calc
Sum of Cations			9.4			meq/L			10/10/17 0:00	calc
Chloride	SM4500Cl-E	1	4.0		*	mg/L	0.5	2	09/22/17 14:20	las
Conductivity @25C	SM2510B	1	884		*	umhos/cm	1	10	09/22/17 17:55	emk
Cyanide, total	M335.4 - Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/23/17 1:31	pjb
Cyanide, WAD	SM4500-CN I,E- Colorimetric w/ distillation	0.5		U	*	mg/L	0.003	0.01	09/25/17 16:16	wtc
Fluoride	SM4500F-C	1	0.84		*	mg/L	0.05	0.3	09/22/17 15:56	emk
Hardness as CaCO3 (dissolved)	SM2340B - Calculation		274			mg/L	0.2	5	10/10/17 0:00	calc
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	1	0.06	B	*	mg/L	0.02	0.1	09/26/17 23:52	pjb
Nitrogen, ammonia	M350.1 Auto Salicylate w/gas diffusion	1		U	*	mg/L	0.05	0.2	10/03/17 11:31	wtc
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	10		U	*	mg/L	1	5	09/27/17 21:07	pjb
pH (lab)	SM4500H+ B									
pH		1	8.2	H	*	units	0.1	0.1	09/22/17 0:00	emk
pH measured at		1	21.5		*	C	0.1	0.1	09/22/17 0:00	emk
Phosphate	Calculation based on dissolved Phosphorus			U		mg/L	0.06	0.2	10/10/17 0:00	calc
Phosphorus, dissolved	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	09/28/17 0:02	pjb
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	1		UH	*	mg/L	0.02	0.05	09/15/17 20:51	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	1		U	*	mg/L	0.02	0.05	10/04/17 22:17	pjb
Residue, Filterable (TDS) @180C	SM2540C	1	604		*	mg/L	10	20	09/17/17 14:17	ecc
Residue, Non-Filterable (TSS) @105C	SM2540D	1		U	*	mg/L	5	20	09/17/17 11:57	ecc
Residue, Total (TS) @ 105C	SM2540B	2	624		*	mg/L	20	40	09/18/17 16:43	che
Sulfate	D516-02/-07 - Turbidimetric	10	283		*	mg/L	10	50	09/25/17 14:56	las
Sulfide as S	SM4500S2-D	1		UH	*	mg/L	0.02	0.1	09/20/17 18:02	enb
TDS (calculated)	Calculation		588			mg/L			10/10/17 0:00	calc
TDS (ratio - measured/calculated)	Calculation		1.03						10/10/17 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: **L39914**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39914-01	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	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.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432331	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).
	WG432115	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432284		M351.2 - TKN by Block Digester	DB	Sample required dilution due to low bias result.
			M351.2 - TKN by Block Digester	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG432288	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	Strontium, dissolved	M200.7 ICP	M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike

Tahoe Resources, Inc.

ACZ Project ID: **L39914**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					level. The recovery of the associated control sample (LCS or LFB) was acceptable.
	WG432016	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.



Tahoe Resources, Inc.

ACZ Project ID: **L39914**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L39914-03	WG431918	Bicarbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
		Carbonate as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG431921	Chloride	SM4500CI-E	Q6	Sample was received above recommended temperature.
	WG431918	Conductivity @25C	SM2510B	Q6	Sample was received above recommended temperature.
	WG431956	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).
	WG432064	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).
	WG431887	Fluoride	SM4500F-C	Q6	Sample was received above recommended temperature.
	WG431918	Hydroxide as CaCO3	SM2320B - Titration	Q6	Sample was received above recommended temperature.
	WG432173	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	Q6	Sample was received above recommended temperature.
	WG432331	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).
	WG432115	Nitrogen, total Kjeldahl	M351.2 - Block Digester	D1	Sample required dilution due to matrix.
			M351.2 - Block Digester	DB	Sample required dilution due to low bias result.
	WG432284		M351.2 - TKN by Block Digester	M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
			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).
	WG431918	pH	SM4500H+ B	Q6	Sample was received above recommended temperature.
		pH measured at	SM4500H+ B	Q6	Sample was received above recommended temperature.
	WG432288	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).
	WG431386	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).
	WG432798	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).
	WG431412	Residue, Filterable (TDS) @180C	SM2540C	N1	See Case Narrative.
			SM2540C	Q6	Sample was received above recommended temperature.
	WG431397	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).
	WG431492	Residue, Total (TS) @ 105C	SM2540B	Q6	Sample was received above recommended temperature.
	WG432369	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.
	WG432016	Sulfate	D516-02/-07 - Turbidimetric	Q6	Sample was received above recommended temperature.

Tahoe Resources, Inc.

ACZ Project ID: **L39914**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
	WG431688	Sulfide as S	SM4500S2-D	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG431918	Total Alkalinity	SM2320B - Titration	Q6	Sample was received above recommended temperature.

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: HW-1

ACZ Sample ID: **L39914-01**  
Date Sampled: 09/12/17 8:30  
Date Received: 09/15/17  
Sample Matrix: Ground Water

**Diesel Range Organics (C10-C28)**

Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520**

**Workgroup: WG431740**

Analyst: jmm  
Extract Date: 09/18/17 15:05  
Analysis Date: 09/21/17 14:23

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	69.7		0.93	*	%	60	120

**Tahoe Resources, Inc.**Project ID: Escobal  
Sample ID: PSA-SRACZ Sample ID: **L39914-03**  
Date Sampled: 09/12/17 9:50  
Date Received: 09/15/17  
Sample Matrix: Ground Water**Diesel Range Organics (C10-C28)**Analysis Method: **M8015D GC/FID**  
Extract Method: **M3520****Workgroup:** WG431740Analyst: jmm  
Extract Date: 09/18/17 15:25  
Analysis Date: 09/21/17 15:34

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
TPH C10 to C28			U	0.93	*	mg/L	0.09	0.5
Surrogate Recoveries	CAS	% Recovery		Dilution	XQ	Units	LCL	UCL
OTP	84-15-1	72.8		0.93	*	%	60	120

**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: **L39914**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
<b>L39914-01</b>	WG431740	*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.
<b>L39914-02</b>	WG431740	*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.
<b>L39914-03</b>	WG431740	*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: **L39914**

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: L39914  
 Date Received: 09/15/2017 14:18  
 Received By:  
 Date Printed: 9/15/2017

**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? <sup>1</sup>	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.

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
5153	10	<=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: L39914  
Date Received: 09/15/2017 14:18  
Received By:  
Date Printed: 9/15/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



Laboratories, Inc.

L39914

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrios
Company: Minera San Rafael
E-mail: LBarrios@sanrafael.com.gt

Address: Blvd los Proceres 18 Calle 24-69 210
Empresarial, 2 Ffadera Torre W oficina 1406
Telephone: (502) 5696 4268

Copy of Report to:

Name: Ebon Quednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: fsamayoa@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: EVQ 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)

Table with columns: Quote #, PO#, Reporting state for compliance testing, Check box if samples include NRC licensed material?, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, and ANALYSES REQUESTED.

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

REMARKS

COC # 2

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 for June Aguilar and Irene Catalan.





Guatemala September 13ht 2017

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.



**ECOSISTEMAS**  
PROYECTOS AMBIENTALES

LABORATORIO AMBIENTAL E INDUSTRIAL

17 avenida 2-39 zona 4 Mixco | Guatemala | Ofibodegas Zaragoza 2 | Bodega 2  
502 + 2437 7224 | 2437 4455

laboratorio@ecosistemas.com.gt | info@ecosistemas.com.gt | www.ecosistemas.com.gt

Ref 2444-17

Pag 1/1

REG 016 Resultados de Análisis

Muestras: 12 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: 180917  
Fecha de ingreso de muestra: 190917  
Fecha de análisis: 190917-270917  
Fecha del informe: 270917

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)
9815	RW-1	68	<1	<0.05	4.90E+02
9816	MW-3	1	<1	<0.05	<1.8
9817	MW-4	4	<1	<0.05	<1.8
9818	MW-5	8	<1	<0.05	<1.8
9819	MW-6	1	<1	<0.05	<1.8
9820	MW-7	7	<1	<0.05	2.30E+01
9821	MW-8	45	<1	<0.05	<1.8
9822	MW-9	629	5	<0.05	<1.8
9823	MW-11	116	6	<0.05	<1.8
9824	MW-20	<1	<1	<0.05	<1.8
9825	MW-21	642	4	<0.05	<1.8
9826	PSA-1	495	7	<0.05	<1.8

**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 acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04

\*\* Análisis referidos a laboratorio acreditado.

Ing. Oscar Páez  
Gerente Técnico



VoBo Ing. Fernando Fuentes  
Gerente de Calidad



Ref 2424-17

Pag 1/1

REG 016 Resultados de Análisis

Muestras: 8 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: 120917  
Fecha de ingreso de muestra: 130917  
Fecha de análisis: 130917-260917  
Fecha del informe: 260917

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)
9752	GW-1A	223	84	<0.05	1.30E+03
9753	GW-2	341	42	<0.05	4.90E+02
9754	GW-3	<1	<1	<0.05	2.30E+01
9755	GW-11	<1	<1	<0.05	2.30E+01
9756	PSA-SR	<1	<1	<0.05	<1.8
9757	HW-1	9	<1	<0.05	<1.8
9758	HW-2	4	<1	<0.05	<1.8
9760	GW-10	<1	<1	<0.05	<1.8

**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 acreditado COGUANOR NTG/ISO/IEC 17025:2005 según OGA LE 006-04

\*\* Análisis referidos a laboratorio acreditado.



Ing. Oscar Páez  
Gerente Técnico




VoBo Ing. Fernando Fuentes  
Gerente de Calidad

## **12.6 Informes originales de los Resultados Analíticos obtenidos del muestreo de sedimentos, Septiembre 2017**

December 14, 2017

## Report to:

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

## Bill to:

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

cc: Fernando Samayoa

Project ID: Escobal

ACZ Project ID: L40759

Luisa Fernanda:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 23, 2017. This project has been assigned to ACZ's project number, L40759. 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 L40759. 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 January 13, 2018. 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.

December 14, 2017

Project ID: Escobal

ACZ Project ID: L40759

**Sample Receipt**

ACZ Laboratories, Inc. (ACZ) received 26 sediment samples from Tahoe Resources, Inc. on October 23, 2017. 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 L40759. 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, HE), 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. Manganese (N1) - Mn had recovery in the LCSSD outside of vendor limits. The LCSS had acceptable results. The MS/D RPD was within method limits, demonstrating precision on the test matrix.

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-8

ACZ Sample ID: **L40759-01**  
Date Sampled: 09/04/17 11:45  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 10:49	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 12:09	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	11400		*	mg/Kg	20	100	11/18/17 14:30	bsu
Antimony, total (3050)	M6020 ICP-MS	505	0.3	B	*	mg/Kg	0.2	1	11/16/17 17:08	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	10.7			mg/Kg	0.1	0.5	11/16/17 17:08	bsu
Barium, total (3050)	M6020 ICP-MS	505	147		*	mg/Kg	0.3	1	11/16/17 17:08	bsu
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	11/16/17 3:29	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.36		*	mg/Kg	0.05	0.3	11/16/17 17:08	bsu
Calcium, total (3050)	M6010B ICP	101	1800			mg/Kg	10	50	11/16/17 3:29	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.7			mg/Kg	0.3	1	11/16/17 17:08	bsu
Copper, total (3050)	M6020 ICP-MS	505	11.2			mg/Kg	0.2	1	11/16/17 17:08	bsu
Iron, total (3050)	M6010B ICP	101	14400		*	mg/Kg	2	5	11/17/17 3:45	aeH
Lead, total (3050)	M6020 ICP-MS	505	13.2		*	mg/Kg	0.05	0.3	11/16/17 17:08	bsu
Magnesium, total (3050)	M6010B ICP	101	840			mg/Kg	20	100	11/16/17 3:29	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	456		*	mg/Kg	8	40	11/18/17 14:30	bsu
Mercury, total	M7471A CVAA	266		UH	*	mg/Kg	0.05	0.3	10/27/17 19:30	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 3:29	aeH
Nickel, total (3050)	M6020 ICP-MS	505	2.0			mg/Kg	0.3	2	11/16/17 17:08	bsu
Potassium, total (3050)	M6010B ICP	101	1960			mg/Kg	20	100	11/16/17 3:29	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.14			mg/Kg	0.05	0.1	11/16/17 17:08	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.23			mg/Kg	0.03	0.1	11/16/17 17:08	bsu
Zinc, total (3050)	M6020 ICP-MS	505	70		*	mg/Kg	1	3	11/16/17 17:08	bsu

**Soil Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	73.2		*	%	0.1	0.5	10/30/17 12:05	ajm

**Soil Preparation**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:23	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 8:55	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 8:55	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:10	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-8

ACZ Sample ID: **L40759-01**

Date Sampled: 09/04/17 11:45

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	31.6		UH	*	mg/Kg	0.2	0.6	10/26/17 20:16	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	86.2	0.0132	H	*	%	0.00086	0.00431	11/18/17 0:26	pjb



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-9

ACZ Sample ID: **L40759-02**  
Date Sampled: 09/04/17 10:20  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 11:14	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 12:35	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	11400		*	mg/Kg	20	100	11/18/17 14:34	bsu
Antimony, total (3050)	M6020 ICP-MS	505	0.7	B	*	mg/Kg	0.2	1	11/16/17 17:14	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	10.2			mg/Kg	0.1	0.5	11/16/17 17:14	bsu
Barium, total (3050)	M6020 ICP-MS	505	132		*	mg/Kg	0.3	1	11/16/17 17:14	bsu
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	11/16/17 3:40	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.31		*	mg/Kg	0.05	0.3	11/16/17 17:14	bsu
Calcium, total (3050)	M6010B ICP	101	2260			mg/Kg	10	50	11/16/17 3:40	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.7			mg/Kg	0.3	1	11/16/17 17:14	bsu
Copper, total (3050)	M6020 ICP-MS	505	8.9			mg/Kg	0.2	1	11/16/17 17:14	bsu
Iron, total (3050)	M6010B ICP	101	11800		*	mg/Kg	2	5	11/17/17 3:56	aeH
Lead, total (3050)	M6020 ICP-MS	505	11.7		*	mg/Kg	0.05	0.3	11/16/17 17:14	bsu
Magnesium, total (3050)	M6010B ICP	101	1050			mg/Kg	20	100	11/16/17 3:40	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	407		*	mg/Kg	8	40	11/18/17 14:34	bsu
Mercury, total	M7471A CVAA	239		UH	*	mg/Kg	0.05	0.2	10/27/17 19:31	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 3:40	aeH
Nickel, total (3050)	M6020 ICP-MS	505	2.2			mg/Kg	0.3	2	11/16/17 17:14	bsu
Potassium, total (3050)	M6010B ICP	101	1630			mg/Kg	20	100	11/16/17 3:40	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.11			mg/Kg	0.05	0.1	11/16/17 17:14	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.27			mg/Kg	0.03	0.1	11/16/17 17:14	bsu
Zinc, total (3050)	M6020 ICP-MS	505	47		*	mg/Kg	1	3	11/16/17 17:14	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	76.8		*	%	0.1	0.5	10/30/17 14:17	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:25	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 9:50	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 9:50	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:12	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-9

ACZ Sample ID: **L40759-02**

Date Sampled: 09/04/17 10:20

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	23.2		UH	*	mg/Kg	0.1	0.5	10/26/17 20:18	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	141	0.0210	H	*	%	0.00141	0.00705	11/18/17 0:30	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-11

ACZ Sample ID: **L40759-03**  
Date Sampled: 09/04/17 11:20  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 11:26	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 13:01	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	14300		*	mg/Kg	20	100	11/18/17 14:36	bsu
Antimony, total (3050)	M6020 ICP-MS	505	1.2		*	mg/Kg	0.2	1	11/16/17 17:17	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	19.4			mg/Kg	0.1	0.5	11/16/17 17:17	bsu
Barium, total (3050)	M6020 ICP-MS	505	139		*	mg/Kg	0.3	1	11/16/17 17:17	bsu
Boron, total (3050)	M6010B ICP	101	2	B		mg/Kg	1	5	11/16/17 3:44	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	2.35		*	mg/Kg	0.05	0.3	11/16/17 17:17	bsu
Calcium, total (3050)	M6010B ICP	101	10600			mg/Kg	10	50	11/16/17 3:44	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.0			mg/Kg	0.3	1	11/16/17 17:17	bsu
Copper, total (3050)	M6020 ICP-MS	505	11.8			mg/Kg	0.2	1	11/16/17 17:17	bsu
Iron, total (3050)	M6010B ICP	101	12200		*	mg/Kg	2	5	11/17/17 4:00	aeH
Lead, total (3050)	M6020 ICP-MS	505	76.1		*	mg/Kg	0.05	0.3	11/16/17 17:17	bsu
Magnesium, total (3050)	M6010B ICP	101	2340			mg/Kg	20	100	11/16/17 3:44	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	2410		*	mg/Kg	8	40	11/18/17 14:36	bsu
Mercury, total	M7471A CVAA	236		UH	*	mg/Kg	0.05	0.2	10/27/17 19:32	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 3:44	aeH
Nickel, total (3050)	M6020 ICP-MS	505	3.3			mg/Kg	0.3	2	11/16/17 17:17	bsu
Potassium, total (3050)	M6010B ICP	101	1320			mg/Kg	20	100	11/16/17 3:44	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.11			mg/Kg	0.05	0.1	11/16/17 17:17	bsu
Silver, total (3050)	M6020 ICP-MS	505	6.29			mg/Kg	0.03	0.1	11/16/17 17:17	bsu
Zinc, total (3050)	M6020 ICP-MS	505	240		*	mg/Kg	1	3	11/16/17 17:17	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	75.7		*	%	0.1	0.5	10/30/17 15:22	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:27	ajm
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 10:09	dbt
Digestion - Hot Plate	M3050B ICP								11/03/17 10:09	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:14	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-11

ACZ Sample ID: **L40759-03**

Date Sampled: 09/04/17 11:20

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	33		UH	*	mg/Kg	0.2	0.7	10/26/17 20:19	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	69.2	0.00696	H	*	%	0.00069	0.00346	11/18/17 0:02	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-1

ACZ Sample ID: **L40759-11**  
Date Sampled: 09/04/17 14:20  
Date Received: 10/23/17  
Sample Matrix: Sediment

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 13:05	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 13:40	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	9730		*	mg/Kg	20	100	11/18/17 14:57	bsu
Antimony, total (3050)	M6020 ICP-MS	505	0.3	B	*	mg/Kg	0.2	1	11/16/17 17:47	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	6.4			mg/Kg	0.1	0.5	11/16/17 17:47	bsu
Barium, total (3050)	M6020 ICP-MS	505	164		*	mg/Kg	0.3	1	11/16/17 17:47	bsu
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	11/16/17 4:27	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.24	B	*	mg/Kg	0.05	0.3	11/16/17 17:47	bsu
Calcium, total (3050)	M6010B ICP	101	2490			mg/Kg	10	50	11/16/17 4:27	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.1			mg/Kg	0.3	1	11/16/17 17:47	bsu
Copper, total (3050)	M6020 ICP-MS	505	8.3			mg/Kg	0.2	1	11/16/17 17:47	bsu
Iron, total (3050)	M6010B ICP	101	13700		*	mg/Kg	2	5	11/17/17 4:43	aeH
Lead, total (3050)	M6020 ICP-MS	505	8.43		*	mg/Kg	0.05	0.3	11/16/17 17:47	bsu
Magnesium, total (3050)	M6010B ICP	101	1190			mg/Kg	20	100	11/16/17 4:27	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	577		*	mg/Kg	8	40	11/18/17 14:57	bsu
Mercury, total	M7471A CVAA	227		UH	*	mg/Kg	0.05	0.2	10/27/17 19:42	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 4:27	aeH
Nickel, total (3050)	M6020 ICP-MS	505	3.3			mg/Kg	0.3	2	11/16/17 17:47	bsu
Potassium, total (3050)	M6010B ICP	101	1590			mg/Kg	20	100	11/16/17 4:27	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.11			mg/Kg	0.05	0.1	11/16/17 17:47	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.15			mg/Kg	0.03	0.1	11/16/17 17:47	bsu
Zinc, total (3050)	M6020 ICP-MS	20200	70	B	*	mg/Kg	40	100	11/18/17 14:57	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	79.1		*	%	0.1	0.5	10/31/17 0:08	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:45	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 12:37	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 12:37	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:34	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-1

ACZ Sample ID: **L40759-11**

Date Sampled: 09/04/17 14:20

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	28.9		UH	*	mg/Kg	0.2	0.6	10/26/17 20:27	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	72.1	0.0125	H	*	%	0.00072	0.00361	11/18/17 0:07	pjb



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-2

ACZ Sample ID: **L40759-12**  
Date Sampled: 09/04/17 12:00  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 13:18	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 13:53	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20400	14200		*	mg/Kg	20	100	11/18/17 14:59	bsu
Antimony, total (3050)	M6020 ICP-MS	510	0.7	B		mg/Kg	0.2	1	11/16/17 17:51	bsu
Arsenic, total (3050)	M6020 ICP-MS	510	17.3			mg/Kg	0.1	0.5	11/16/17 17:51	bsu
Barium, total (3050)	M6020 ICP-MS	510	184		*	mg/Kg	0.3	1	11/16/17 17:51	bsu
Boron, total (3050)	M6010B ICP	102	1	B		mg/Kg	1	5	11/16/17 4:31	aeH
Cadmium, total (3050)	M6020 ICP-MS	510	2.71		*	mg/Kg	0.05	0.3	11/16/17 17:51	bsu
Calcium, total (3050)	M6010B ICP	102	4590			mg/Kg	10	50	11/16/17 4:31	aeH
Chromium, total (3050)	M6020 ICP-MS	510	4.1			mg/Kg	0.3	1	11/16/17 17:51	bsu
Copper, total (3050)	M6020 ICP-MS	510	13.8			mg/Kg	0.2	1	11/16/17 17:51	bsu
Iron, total (3050)	M6010B ICP	102	13500		*	mg/Kg	2	5	11/17/17 4:47	aeH
Lead, total (3050)	M6020 ICP-MS	510	87.8		*	mg/Kg	0.05	0.3	11/16/17 17:51	bsu
Magnesium, total (3050)	M6010B ICP	102	2110			mg/Kg	20	100	11/16/17 4:31	aeH
Manganese, total (3050)	M6020 ICP-MS	20400	697		*	mg/Kg	8	40	11/18/17 14:59	bsu
Mercury, total	M7471A CVAA	232		UH	*	mg/Kg	0.05	0.2	10/27/17 19:43	sck
Molybdenum, total (3050)	M6010B ICP	102		U		mg/Kg	2	10	11/16/17 4:31	aeH
Nickel, total (3050)	M6020 ICP-MS	510	4.4			mg/Kg	0.3	2	11/16/17 17:51	bsu
Potassium, total (3050)	M6010B ICP	102	1430			mg/Kg	20	100	11/16/17 4:31	aeH
Selenium, total (3050)	M6020 ICP-MS	510	0.17			mg/Kg	0.05	0.1	11/16/17 17:51	bsu
Silver, total (3050)	M6020 ICP-MS	510	1.74			mg/Kg	0.03	0.1	11/16/17 17:51	bsu
Zinc, total (3050)	M6020 ICP-MS	510	267		*	mg/Kg	1	3	11/16/17 17:51	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	73.0		*	%	0.1	0.5	10/31/17 1:14	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:47	ajm
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 12:55	dbt
Digestion - Hot Plate	M3050B ICP								11/03/17 12:55	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:36	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-2

ACZ Sample ID: **L40759-12**

Date Sampled: 09/04/17 12:00

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	28		UH	*	mg/Kg	0.2	0.6	10/26/17 20:28	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	184	0.00821	BH	*	%	0.00184	0.0092	11/18/17 0:08	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-2A

ACZ Sample ID: **L40759-13**  
Date Sampled: 09/04/17 11:20  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 13:30	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 14:06	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	14600		*	mg/Kg	20	100	11/18/17 15:10	bsu
Antimony, total (3050)	M6020 ICP-MS	505	1.4		*	mg/Kg	0.2	1	11/16/17 18:06	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	28.3			mg/Kg	0.1	0.5	11/16/17 18:06	bsu
Barium, total (3050)	M6020 ICP-MS	505	158		*	mg/Kg	0.3	1	11/16/17 18:06	bsu
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	11/16/17 4:35	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	1.89		*	mg/Kg	0.05	0.3	11/16/17 18:06	bsu
Calcium, total (3050)	M6010B ICP	101	9090			mg/Kg	10	50	11/16/17 4:35	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.4			mg/Kg	0.3	1	11/16/17 18:06	bsu
Copper, total (3050)	M6020 ICP-MS	505	13.3			mg/Kg	0.2	1	11/16/17 18:06	bsu
Iron, total (3050)	M6010B ICP	101	11300		*	mg/Kg	2	5	11/17/17 4:51	aeH
Lead, total (3050)	M6020 ICP-MS	505	90.1		*	mg/Kg	0.05	0.3	11/16/17 18:06	bsu
Magnesium, total (3050)	M6010B ICP	101	1960			mg/Kg	20	100	11/16/17 4:35	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	1970		*	mg/Kg	8	40	11/18/17 15:10	bsu
Mercury, total	M7471A CVAA	225		UH	*	mg/Kg	0.05	0.2	10/27/17 19:44	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 4:35	aeH
Nickel, total (3050)	M6020 ICP-MS	505	5.1			mg/Kg	0.3	2	11/16/17 18:06	bsu
Potassium, total (3050)	M6010B ICP	101	1290			mg/Kg	20	100	11/16/17 4:35	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.12			mg/Kg	0.05	0.1	11/16/17 18:06	bsu
Silver, total (3050)	M6020 ICP-MS	505	9.36			mg/Kg	0.03	0.1	11/16/17 18:06	bsu
Zinc, total (3050)	M6020 ICP-MS	505	171		*	mg/Kg	1	3	11/16/17 18:06	bsu

**Soil Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	77.6		*	%	0.1	0.5	10/31/17 2:20	ajm

**Soil Preparation**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:49	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 13:50	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 13:50	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:38	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-2A

ACZ Sample ID: **L40759-13**

Date Sampled: 09/04/17 11:20

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	31.3		UH	*	mg/Kg	0.2	0.6	10/26/17 20:29	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	178	0.0127	H	*	%	0.00178	0.0089	11/18/17 0:09	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-2B

ACZ Sample ID: **L40759-14**  
Date Sampled: 09/04/17 10:40  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 13:42	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								12/07/17 11:47	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	12400		*	mg/Kg	20	100	11/18/17 15:12	bsu
Antimony, total (3050)	M6020 ICP-MS	505	0.7	B	*	mg/Kg	0.2	1	11/16/17 18:09	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	15.1			mg/Kg	0.1	0.5	11/16/17 18:09	bsu
Barium, total (3050)	M6020 ICP-MS	505	124		*	mg/Kg	0.3	1	11/16/17 18:09	bsu
Boron, total (3050)	M6010B ICP	101	2	B		mg/Kg	1	5	11/16/17 4:39	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	1.98		*	mg/Kg	0.05	0.3	11/16/17 18:09	bsu
Calcium, total (3050)	M6010B ICP	101	12100			mg/Kg	10	50	11/16/17 4:39	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.1			mg/Kg	0.3	1	11/16/17 18:09	bsu
Copper, total (3050)	M6020 ICP-MS	505	9.5			mg/Kg	0.2	1	11/16/17 18:09	bsu
Iron, total (3050)	M6010B ICP	101	11400		*	mg/Kg	2	5	11/17/17 4:55	aeH
Lead, total (3050)	M6020 ICP-MS	505	40.5		*	mg/Kg	0.05	0.3	11/16/17 18:09	bsu
Magnesium, total (3050)	M6010B ICP	101	2260			mg/Kg	20	100	11/16/17 4:39	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	1000		*	mg/Kg	8	40	11/18/17 15:12	bsu
Mercury, total	M7471A CVAA	256	0.05	BH	*	mg/Kg	0.05	0.3	10/27/17 19:45	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 4:39	aeH
Nickel, total (3050)	M6020 ICP-MS	505	3.3			mg/Kg	0.3	2	11/16/17 18:09	bsu
Potassium, total (3050)	M6010B ICP	101	1440			mg/Kg	20	100	11/16/17 4:39	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.11			mg/Kg	0.05	0.1	11/16/17 18:09	bsu
Silver, total (3050)	M6020 ICP-MS	505	1.56			mg/Kg	0.03	0.1	11/16/17 18:09	bsu
Zinc, total (3050)	M6020 ICP-MS	505	204		*	mg/Kg	1	3	11/16/17 18:09	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	72.9		*	%	0.1	0.5	10/31/17 3:25	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:51	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 14:09	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 14:09	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:41	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-2B

ACZ Sample ID: **L40759-14**

Date Sampled: 09/04/17 10:40

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	29.5		UH	*	mg/Kg	0.2	0.6	10/26/17 20:30	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	218	0.0390	H	*	%	0.00218	0.0109	12/08/17 0:07	pjb



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-3

ACZ Sample ID: **L40759-15**  
Date Sampled: 09/04/17 14:55  
Date Received: 10/23/17  
Sample Matrix: Sediment

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 13:55	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								12/07/17 12:03	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	7530		*	mg/Kg	20	100	11/18/17 15:14	bsu
Antimony, total (3050)	M6020 ICP-MS	505	2.1		*	mg/Kg	0.2	1	11/16/17 18:12	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	27.2			mg/Kg	0.1	0.5	11/16/17 18:12	bsu
Barium, total (3050)	M6020 ICP-MS	505	256		*	mg/Kg	0.3	1	11/16/17 18:12	bsu
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	11/16/17 4:50	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.17	B	*	mg/Kg	0.05	0.3	11/16/17 18:12	bsu
Calcium, total (3050)	M6010B ICP	101	3040			mg/Kg	10	50	11/16/17 4:50	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.7			mg/Kg	0.3	1	11/16/17 18:12	bsu
Copper, total (3050)	M6020 ICP-MS	505	5.2			mg/Kg	0.2	1	11/16/17 18:12	bsu
Iron, total (3050)	M6010B ICP	101	13200		*	mg/Kg	2	5	11/17/17 5:07	aeH
Lead, total (3050)	M6020 ICP-MS	505	11.4		*	mg/Kg	0.05	0.3	11/16/17 18:12	bsu
Magnesium, total (3050)	M6010B ICP	101	980			mg/Kg	20	100	11/16/17 4:50	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	451		*	mg/Kg	8	40	11/18/17 15:14	bsu
Mercury, total	M7471A CVAA	237		UH	*	mg/Kg	0.05	0.2	10/27/17 19:56	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 4:50	aeH
Nickel, total (3050)	M6020 ICP-MS	505	2.6			mg/Kg	0.3	2	11/16/17 18:12	bsu
Potassium, total (3050)	M6010B ICP	101	1590			mg/Kg	20	100	11/16/17 4:50	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.09	B		mg/Kg	0.05	0.1	11/16/17 18:12	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.03	B		mg/Kg	0.03	0.1	11/16/17 18:12	bsu
Zinc, total (3050)	M6020 ICP-MS	20200	50	B	*	mg/Kg	40	100	11/18/17 15:14	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	75.8		*	%	0.1	0.5	10/31/17 4:31	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:53	ajm
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 14:27	dbt
Digestion - Hot Plate	M3050B ICP								11/03/17 14:27	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:43	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-3

ACZ Sample ID: **L40759-15**

Date Sampled: 09/04/17 14:55

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	31.7		UH	*	mg/Kg	0.2	0.6	10/26/17 20:31	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	150	0.0121	H	*	%	0.0015	0.0075	12/08/17 0:10	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-4

ACZ Sample ID: **L40759-16**  
Date Sampled: 09/04/17 15:30  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 14:07	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								12/07/17 12:20	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	9010		*	mg/Kg	20	100	11/18/17 15:16	bsu
Antimony, total (3050)	M6020 ICP-MS	505	2.1		*	mg/Kg	0.2	1	11/16/17 18:15	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	13.8			mg/Kg	0.1	0.5	11/16/17 18:15	bsu
Barium, total (3050)	M6020 ICP-MS	505	171		*	mg/Kg	0.3	1	11/16/17 18:15	bsu
Boron, total (3050)	M6010B ICP	101	2	B		mg/Kg	1	5	11/16/17 4:54	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.21	B	*	mg/Kg	0.05	0.3	11/16/17 18:15	bsu
Calcium, total (3050)	M6010B ICP	101	2270			mg/Kg	10	50	11/16/17 4:54	aeH
Chromium, total (3050)	M6020 ICP-MS	505	6.0			mg/Kg	0.3	1	11/16/17 18:15	bsu
Copper, total (3050)	M6020 ICP-MS	505	5.2			mg/Kg	0.2	1	11/16/17 18:15	bsu
Iron, total (3050)	M6010B ICP	101	19100		*	mg/Kg	2	5	11/17/17 5:11	aeH
Lead, total (3050)	M6020 ICP-MS	505	9.86		*	mg/Kg	0.05	0.3	11/16/17 18:15	bsu
Magnesium, total (3050)	M6010B ICP	101	1020			mg/Kg	20	100	11/16/17 4:54	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	450		*	mg/Kg	8	40	11/18/17 15:16	bsu
Mercury, total	M7471A CVAA	263		UH	*	mg/Kg	0.05	0.3	10/27/17 19:59	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 4:54	aeH
Nickel, total (3050)	M6020 ICP-MS	505	3.0			mg/Kg	0.3	2	11/16/17 18:15	bsu
Potassium, total (3050)	M6010B ICP	101	1680			mg/Kg	20	100	11/16/17 4:54	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.11			mg/Kg	0.05	0.1	11/16/17 18:15	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.09	B		mg/Kg	0.03	0.1	11/16/17 18:15	bsu
Zinc, total (3050)	M6020 ICP-MS	505	47		*	mg/Kg	1	3	11/16/17 18:15	bsu

**Soil Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	70.6		*	%	0.1	0.5	10/31/17 5:37	ajm

**Soil Preparation**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:56	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 14:46	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 14:46	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:46	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-4

ACZ Sample ID: **L40759-16**

Date Sampled: 09/04/17 15:30

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	32.3		UH	*	mg/Kg	0.2	0.6	10/26/17 20:34	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	116	0.0138	H	*	%	0.00116	0.0058	12/08/17 0:11	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-4A

ACZ Sample ID: **L40759-17**  
Date Sampled: 09/04/17 10:10  
Date Received: 10/23/17  
Sample Matrix: Sediment

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 14:20	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								12/07/17 12:36	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	10400		*	mg/Kg	20	100	11/18/17 15:18	bsu
Antimony, total (3050)	M6020 ICP-MS	505	2.0		*	mg/Kg	0.2	1	11/16/17 18:18	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	15.5			mg/Kg	0.1	0.5	11/16/17 18:18	bsu
Barium, total (3050)	M6020 ICP-MS	505	223		*	mg/Kg	0.3	1	11/16/17 18:18	bsu
Boron, total (3050)	M6010B ICP	101	2	B		mg/Kg	1	5	11/16/17 4:58	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.24	B	*	mg/Kg	0.05	0.3	11/16/17 18:18	bsu
Calcium, total (3050)	M6010B ICP	101	3150			mg/Kg	10	50	11/16/17 4:58	aeH
Chromium, total (3050)	M6020 ICP-MS	505	5.3			mg/Kg	0.3	1	11/16/17 18:18	bsu
Copper, total (3050)	M6020 ICP-MS	505	6.0			mg/Kg	0.2	1	11/16/17 18:18	bsu
Iron, total (3050)	M6010B ICP	101	15100		*	mg/Kg	2	5	11/17/17 5:15	aeH
Lead, total (3050)	M6020 ICP-MS	505	10.6		*	mg/Kg	0.05	0.3	11/16/17 18:18	bsu
Magnesium, total (3050)	M6010B ICP	101	1180			mg/Kg	20	100	11/16/17 4:58	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	446		*	mg/Kg	8	40	11/18/17 15:18	bsu
Mercury, total	M7471A CVAA	229		UH	*	mg/Kg	0.05	0.2	10/27/17 20:00	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 4:58	aeH
Nickel, total (3050)	M6020 ICP-MS	505	3.0			mg/Kg	0.3	2	11/16/17 18:18	bsu
Potassium, total (3050)	M6010B ICP	101	1640			mg/Kg	20	100	11/16/17 4:58	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.10			mg/Kg	0.05	0.1	11/16/17 18:18	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.29			mg/Kg	0.03	0.1	11/16/17 18:18	bsu
Zinc, total (3050)	M6020 ICP-MS	20200	70	B	*	mg/Kg	40	100	11/18/17 15:18	bsu

**Soil Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	75.7		*	%	0.1	0.5	10/31/17 6:42	ajm

**Soil Preparation**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 9:58	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 15:04	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 15:04	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:48	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-4A

ACZ Sample ID: **L40759-17**

Date Sampled: 09/04/17 10:10

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	27.8		UH	*	mg/Kg	0.2	0.6	10/26/17 20:35	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	178	0.0129	H	*	%	0.00178	0.0089	12/08/17 0:12	pjb



**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-5

ACZ Sample ID: **L40759-18**

Date Sampled: 09/28/17 10:42

Date Received: 10/23/17

Sample Matrix: *Sediment*

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 14:32	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								12/07/17 12:52	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	11800		*	mg/Kg	20	100	11/18/17 15:20	bsu
Antimony, total (3050)	M6020 ICP-MS	505	0.3	B	*	mg/Kg	0.2	1	11/16/17 18:21	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	10.3			mg/Kg	0.1	0.5	11/16/17 18:21	bsu
Barium, total (3050)	M6020 ICP-MS	505	155		*	mg/Kg	0.3	1	11/16/17 18:21	bsu
Boron, total (3050)	M6010B ICP	101	2	B		mg/Kg	1	5	11/16/17 5:02	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.23	B	*	mg/Kg	0.05	0.3	11/16/17 18:21	bsu
Calcium, total (3050)	M6010B ICP	101	1170			mg/Kg	10	50	11/16/17 5:02	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.7			mg/Kg	0.3	1	11/16/17 18:21	bsu
Copper, total (3050)	M6020 ICP-MS	505	5.8			mg/Kg	0.2	1	11/16/17 18:21	bsu
Iron, total (3050)	M6010B ICP	101	17700		*	mg/Kg	2	5	11/17/17 5:19	aeH
Lead, total (3050)	M6020 ICP-MS	505	12.3		*	mg/Kg	0.05	0.3	11/16/17 18:21	bsu
Magnesium, total (3050)	M6010B ICP	101	700			mg/Kg	20	100	11/16/17 5:02	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	564		*	mg/Kg	8	40	11/18/17 15:20	bsu
Mercury, total	M7471A CVAA	254	0.12	BH	*	mg/Kg	0.05	0.3	10/27/17 20:01	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 5:02	aeH
Nickel, total (3050)	M6020 ICP-MS	505	1.4	B		mg/Kg	0.3	2	11/16/17 18:21	bsu
Potassium, total (3050)	M6010B ICP	101	1960			mg/Kg	20	100	11/16/17 5:02	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.14			mg/Kg	0.05	0.1	11/16/17 18:21	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.06	B		mg/Kg	0.03	0.1	11/16/17 18:21	bsu
Zinc, total (3050)	M6020 ICP-MS	20200	60	B	*	mg/Kg	40	100	11/18/17 15:20	bsu

**Soil Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	67.0		*	%	0.1	0.5	10/31/17 7:48	ajm

**Soil Preparation**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 10:00	ajm
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 15:23	dbt
Digestion - Hot Plate	M3050B ICP								11/03/17 15:23	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:50	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-5

ACZ Sample ID: **L40759-18**

Date Sampled: 09/28/17 10:42

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	35.1		UH	*	mg/Kg	0.2	0.7	10/26/17 20:35	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	219	0.0121	H	*	%	0.00219	0.011	12/08/17 0:13	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-6

ACZ Sample ID: **L40759-19**  
Date Sampled: 09/04/17 09:20  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								10/26/17 14:44	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 14:19	wtc

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20000	8720		*	mg/Kg	20	100	11/18/17 15:23	bsu
Antimony, total (3050)	M6020 ICP-MS	500	1.4		*	mg/Kg	0.2	1	11/16/17 18:24	bsu
Arsenic, total (3050)	M6020 ICP-MS	500	6.1			mg/Kg	0.1	0.5	11/16/17 18:24	bsu
Barium, total (3050)	M6020 ICP-MS	500	131		*	mg/Kg	0.3	1	11/16/17 18:24	bsu
Boron, total (3050)	M6010B ICP	100	1	B		mg/Kg	1	5	11/16/17 5:06	aeH
Cadmium, total (3050)	M6020 ICP-MS	500	0.16	B	*	mg/Kg	0.05	0.3	11/16/17 18:24	bsu
Calcium, total (3050)	M6010B ICP	100	1410			mg/Kg	10	50	11/16/17 5:06	aeH
Chromium, total (3050)	M6020 ICP-MS	500	4.6			mg/Kg	0.3	1	11/16/17 18:24	bsu
Copper, total (3050)	M6020 ICP-MS	500	6.4			mg/Kg	0.2	1	11/16/17 18:24	bsu
Iron, total (3050)	M6010B ICP	100	12800		*	mg/Kg	2	5	11/17/17 5:23	aeH
Lead, total (3050)	M6020 ICP-MS	500	6.12		*	mg/Kg	0.05	0.3	11/16/17 18:24	bsu
Magnesium, total (3050)	M6010B ICP	100	1070			mg/Kg	20	100	11/16/17 5:06	aeH
Manganese, total (3050)	M6020 ICP-MS	20000	476		*	mg/Kg	8	40	11/18/17 15:23	bsu
Mercury, total	M7471A CVAA	263		UH	*	mg/Kg	0.05	0.3	10/27/17 20:05	sck
Molybdenum, total (3050)	M6010B ICP	100		U		mg/Kg	2	10	11/16/17 5:06	aeH
Nickel, total (3050)	M6020 ICP-MS	500	2.2			mg/Kg	0.3	2	11/16/17 18:24	bsu
Potassium, total (3050)	M6010B ICP	100	1340			mg/Kg	20	100	11/16/17 5:06	aeH
Selenium, total (3050)	M6020 ICP-MS	500	0.11			mg/Kg	0.05	0.1	11/16/17 18:24	bsu
Silver, total (3050)	M6020 ICP-MS	500	0.05	B		mg/Kg	0.03	0.1	11/16/17 18:24	bsu
Zinc, total (3050)	M6020 ICP-MS	20000	50	B	*	mg/Kg	40	100	11/18/17 15:23	bsu

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	70.5		*	%	0.1	0.5	10/31/17 8:54	ajm

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 10:02	ajm
Digestion - Hot Plate	M3050B ICP								11/03/17 15:41	dbt
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 15:41	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:53	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-6

ACZ Sample ID: **L40759-19**  
Date Sampled: 09/04/17 09:20  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	29.6		UH	*	mg/Kg	0.2	0.6	10/26/17 20:36	pjb
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	155	0.0113	H	*	%	0.00155	0.00775	11/18/17 0:11	pjb

**Tahoe Resources, Inc.**

Project ID: Escobal  
Sample ID: SED-7

ACZ Sample ID: **L40759-20**  
Date Sampled: 09/04/17 08:25  
Date Received: 10/23/17  
Sample Matrix: *Sediment*

**Inorganic Prep**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9013 - Manual Distillation								11/07/17 16:12	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid Digestion								11/17/17 14:32	wtc

**Metals Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Aluminum, total (3050)	M6020 ICP-MS	20200	9810		*	mg/Kg	20	100	11/18/17 15:25	bsu
Antimony, total (3050)	M6020 ICP-MS	505	0.7	B	*	mg/Kg	0.2	1	11/16/17 18:27	bsu
Arsenic, total (3050)	M6020 ICP-MS	505	11.8			mg/Kg	0.1	0.5	11/16/17 18:27	bsu
Barium, total (3050)	M6020 ICP-MS	505	155		*	mg/Kg	0.3	1	11/16/17 18:27	bsu
Boron, total (3050)	M6010B ICP	101	1	B		mg/Kg	1	5	11/16/17 5:10	aeH
Cadmium, total (3050)	M6020 ICP-MS	505	0.21	B	*	mg/Kg	0.05	0.3	11/16/17 18:27	bsu
Calcium, total (3050)	M6010B ICP	101	1710			mg/Kg	10	50	11/16/17 5:10	aeH
Chromium, total (3050)	M6020 ICP-MS	505	3.3			mg/Kg	0.3	1	11/16/17 18:27	bsu
Copper, total (3050)	M6020 ICP-MS	505	6.8			mg/Kg	0.2	1	11/16/17 18:27	bsu
Iron, total (3050)	M6010B ICP	101	12000		*	mg/Kg	2	5	11/17/17 5:27	aeH
Lead, total (3050)	M6020 ICP-MS	505	7.80		*	mg/Kg	0.05	0.3	11/16/17 18:27	bsu
Magnesium, total (3050)	M6010B ICP	101	1250			mg/Kg	20	100	11/16/17 5:10	aeH
Manganese, total (3050)	M6020 ICP-MS	20200	516		*	mg/Kg	8	40	11/18/17 15:25	bsu
Mercury, total	M7471A CVAA	277		UH	*	mg/Kg	0.06	0.3	10/27/17 20:06	sck
Molybdenum, total (3050)	M6010B ICP	101		U		mg/Kg	2	10	11/16/17 5:10	aeH
Nickel, total (3050)	M6020 ICP-MS	505	2.3			mg/Kg	0.3	2	11/16/17 18:27	bsu
Potassium, total (3050)	M6010B ICP	101	1770			mg/Kg	20	100	11/16/17 5:10	aeH
Selenium, total (3050)	M6020 ICP-MS	505	0.08	B		mg/Kg	0.05	0.1	11/16/17 18:27	bsu
Silver, total (3050)	M6020 ICP-MS	505	0.06	B		mg/Kg	0.03	0.1	11/16/17 18:27	bsu
Zinc, total (3050)	M6020 ICP-MS	20200	120		*	mg/Kg	40	100	11/18/17 15:25	bsu

**Soil Analysis**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Solids, Percent	D2216-80	1	71.6		*	%	0.1	0.5	10/31/17 10:00	ajm

**Soil Preparation**

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								10/30/17 10:04	ajm
Digestion - Hot Plate	M3050B ICP-MS								11/03/17 16:00	dbt
Digestion - Hot Plate	M3050B ICP								11/03/17 16:00	dbt
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2								11/02/17 10:55	dbt

**Tahoe Resources, Inc.**

Project ID: Escobal

Sample ID: SED-7

ACZ Sample ID: **L40759-20**

Date Sampled: 09/04/17 08:25

Date Received: 10/23/17

Sample Matrix: *Sediment*

## Wet Chemistry

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Cyanide, total	M9012B - Automated Colorimetric	28		UH	*	mg/Kg	0.2	0.6	11/06/17 21:14	wtc
Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	164	0.0118	H	*	%	0.00164	0.0082	11/18/17 0:12	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: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-01	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
			M6020 ICP-MS	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
WG434608		Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
WG436202		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.
WG436231		Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
WG436378		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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
WG434519		Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
WG436231		Zinc, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-02	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
			M6020 ICP-MS	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
WG434608		Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
WG436202		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.
WG436231		Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
WG436378		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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
WG434519		Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
WG436231		Zinc, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-11	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
			M6020 ICP-MS	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
	WG434519	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG436412	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
	WG436378	Zinc, 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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-12	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	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.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
M7471A CVAA			H3	Sample was received and analyzed past holding time.	
WG434519	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.	
		M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.	
WG436231	Zinc, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.	
		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.	

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-13	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
				ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
				M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
				Q6	Sample was received above recommended temperature.
				RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
WG436378	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.	
			N1	See Case Narrative.	
WG434519	Mercury, total	M7471A CVAA	H3	Sample was received and analyzed past holding time.	
			Q6	Sample was received above recommended temperature.	
WG436412	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.	
WG436231	Zinc, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.	
			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.	
			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.	



Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-14	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
			M6020 ICP-MS	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
WG434608		Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
WG436202		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.
WG436231		Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
WG436378		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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
WG434519		Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
WG437696		Phosphorus, total	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).
			M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
WG436231		Zinc, 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.
			M6020 ICP-MS		

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-15	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608			Cyanide, total	M9012B - Automated Colorimetric
		M9012B - Automated Colorimetric	M1		Matrix spike recovery was high, 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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
	WG434520	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
	WG437696	Phosphorus, total	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).
			WG436378	Zinc, total (3050)	M6020 ICP-MS
	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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-16	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
				ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
				M1	Matrix spike recovery was high, the recovery of the associated control sample (LCS or LFB) was acceptable.
				Q6	Sample was received above recommended temperature.
				RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
WG436378	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.	
			N1	See Case Narrative.	
WG434520	Mercury, total	M7471A CVAA	H3	Sample was received and analyzed past holding time.	
			Q6	Sample was received above recommended temperature.	
WG437696	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.	
			RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).	
WG436231	Zinc, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.	
			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.	
			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.	

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-17	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
			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.
					The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
	WG434520	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG437696	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
			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).
	WG436378	Zinc, 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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-18	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
	WG434520	Mercury, total	M7471A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG437696	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H1	Sample prep or analysis performed past holding time. See case narrative.
			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).
	WG436378	Zinc, 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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-19	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
			M6020 ICP-MS	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
WG434608	Cyanide, total		M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
WG436202	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.	
WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.	
WG436378	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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
WG434520	Mercury, total		M7471A CVAA	Q6	Sample was received above recommended temperature.
			M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
WG436412	Phosphorus, total		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.



Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-20	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG435433			Cyanide, total	M9012B - Automated Colorimetric
		M9012B - Automated Colorimetric	LA		Recovery for target analyte in the control sample (LCS or LFB) exceeded the acceptance criteria. Target analyte was not detected in the sample [ $<$ MDL].
		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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
	WG434520	Mercury, total	M7471A CVAA	H3	Sample was received and analyzed past holding time.
			M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG436412	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
	WG436378	Zinc, 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.

Tahoe Resources, Inc.

ACZ Project ID: **L40759**

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L40759-03	WG436378	Aluminum, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.
	WG436231	Antimony, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, 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.
		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.
			M6020 ICP-MS	ZG	The ICP or ICP-MS Serial Dilution was not used for data validation because the sample concentration was less than 50 times the MDL.
	WG434608	Cyanide, total	M9012B - Automated Colorimetric	H3	Sample was received and analyzed past holding time.
			M9012B - Automated Colorimetric	M1	Matrix spike recovery was high, 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).
	WG436202	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.
	WG436231	Lead, total (3050)	M6020 ICP-MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
	WG436378	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	N1	See Case Narrative.
			M7471A CVAA	H3	Sample was received and analyzed past holding time.
	WG434519	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG436412	Phosphorus, total	M365.1 - Auto Ascorbic Acid (digest)	H3	Sample was received and analyzed past holding time.
	WG436231	Zinc, total (3050)	M6020 ICP-MS	B7	Target analyte detected in prep / method blank at or above acceptance limit. Sample value is > 10X the concentration in the method blank.
			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.

Tahoe Resources, Inc.  
Escobal

ACZ Project ID: L40759  
Date Received: 10/23/2017 14:20  
Received By:  
Date Printed: 10/25/2017

<sup>1</sup> 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), Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> preserved vial (organics), and HG-1631 (total/dissolved mercury by method 1631).



# Laboratories, Inc.

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

C40759

## CHAIN of CUSTODY

### Report to:

Name: Luisa fernanda Barrios

Company: Minera San Rafael

E-mail: LBarrios@sanrafael.com.gt

Address: Bvd. los Próceres 18 calle 24-69 Z10  
Empresarial, Z Pradera, Torre W Oficina 1406

Telephone: (502) 5696 4268

### Copy of Report to:

Name: Evon Quednow Sanrafael Com.gt

Company: Minera San Rafael

E-mail: f.samayoa@sanrafael.com.gt

Telephone:

### Invoice to:

Name: Luisa fernanda Barrios

Company:

E-mail:

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?  
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

YES

NO

### 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: Evon

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

Quote #:

PO#: El Escobal

Reporting state for compliance testing:

Check box if samples include NRC licensed material?

### SAMPLE IDENTIFICATION

DATE:TIME

Matrix

# of Containers

SED

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	SED
Sed- 8	04/09/17 11:45	SO	1	/
Sed- 9	04/09/17 10:20	SO	1	/
Sed- 11	04/09/17 11:20	SO	1	/
Sed-GW-1A	12/09/17 05:32	SO	1	/
Sed- GW.2	12/09/17 11:00	SO	1	/
Sed- GW6	26/09/17 07:27	SO	1	/
Sed- GW7	26/09/17 08:35	SO	1	/
Sed- GW8	26/09/17 07:47	SO	1	/
Sed- GW9	26/09/17 11:00	SO	1	/
Sed- GW12	26/09/17 10:30	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

Luisa fernanda Barrios  
Juan A. Lona

11/10/17 14:00  
12/10/17 08:15

Evon  
BCE

12-10-17 09:00  
12/18/17

(11)



Laboratories, Inc.

C40759

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrías
Company: Minera San Rafael
E-mail: LBarr:05@sanrafael.com.gt

Address: Blvd Los Próceres 18 Calle 24-69 Zon
Empresarial, 2/ pradera, Torre IV Oficina 408
Telephone: (502) 56964268

Copy of Report to:

Name: Elnor Quednow@sanrafael.com.gt
Company: Minera San Rafael

E-mail: Fsamayoa@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrías
Company:
E-mail:

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: EVD 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 analysis results columns.

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.

Table with columns: RELINQUISHED BY, DATE:TIME, RECEIVED BY, DATE:TIME. Includes signatures and dates.

Handwritten number 2 in a circle



Laboratories, Inc.

(40759)

CHAIN of CUSTODY

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

Report to:

Name: Luisa Fernanda Barrios
Company: Minera San Rafael
E-mail: LBarrios@Sanrafael.com.gt

Address: Blvd los Proceres 18 calle 24-69 210
Empresarial, 2 Pradera, Torre IV Oficina 1406
Telephone: (502) 5696 4268

Copy of Report to:

Name: EVonQuednow@sanrafael.com.gt.
Company: Minera San Rafael

E-mail: FSamayoa@sanrafael.com.gt
Telephone:

Invoice to:

Name: Luisa Fernanda Barrios
Company:
E-mail:

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: ERQ/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)

Table with columns: Quote #, PO#, Reporting state, Check box, SAMPLE IDENTIFICATION, DATE:TIME, Matrix, # of Containers, Sed, and multiple empty columns for analyses.

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.

Table with columns: RELINQUISHED BY, DATE:TIME, RECEIVED BY, DATE:TIME. Includes signatures and dates for Luisa Fernanda Barrios and Junw Aguilera.

(3)



Tahoe Resources, Inc.  
 Escobal

ACZ Project ID: L40759  
 Date Received: 10/23/2017 14:20  
 Received By:  
 Date Printed: 10/25/2017

**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 Page 1 Sample ID Line 4 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? <sup>1</sup>			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	

NA indicates Not Applicable

**Chain of Custody Related Remarks**

**Client Contact Remarks**

**Shipping Containers**

Cooler Id	Temp(°C)	Temp Criteria(°C)	Rad(µR/Hr)	Custody Seal Intact?
NA27154	16.4	<=6.0	13	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.



Guatemala, October 12th 2017

### QUARANTINE STATEMENT

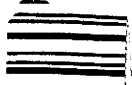
To whom it might concern:

Minera San Rafael, S.A is sending a case of sediment samples, which require quarantine and documentation due to organic content. These samples will be analyzed by ACZ Laboratories Inc. in Steamboat Springs, Colorado, USA.

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

Best regards,

Miguel Berganza  
Environment Department  
Proyecto Escobal, S. A.



**SERVICIOS INTERNACIONALES  
GUIA UPS (UPS WAYBILL)  
(no negociable)**

INSTRUCCIONES ESPECIALES

<b>4</b>	<b>CATEGORIA DEL SERVICIO</b>	(Marque una "X" e indique solo 1 categoría. Para más información, lea la guía de servicios.)
	<b>EXPRESS PLUS</b>	<input type="checkbox"/>
	<b>EXPRESS</b>	<input checked="" type="checkbox"/>
	<b>EXPRESS FREIGHT</b>	<input type="checkbox"/>
	<b>EXPRESS SAVER</b>	<input type="checkbox"/>
	<b>EXPEDITED</b>	<input type="checkbox"/>

<b>5</b>		<b>INFORMACION SOBRE EL ENVIO</b>	
<b>NUMEROS TOTAL DE PAQUETES/PALETAS EN EL ENVIO</b>	<b>PESO REAL TOTAL DEL ENVIO</b>	<b>PESO TOTAL EXCEPTO PARA ENVIO DIMENSIONAL / Múltiple Paqueteable, si aplica</b>	<b>ZONA</b>
01	INDIQUE kg o lb	INDIQUE kg o lb	03
<input type="checkbox"/> Marque con una "X" si Todos los Paquetes/Paletas son del Mismo Peso y Tamaño <input type="checkbox"/> Marque con una "X" si el Cargo por Paquete de Mayor Tamaño Aplica al Paquete Principal <input type="checkbox"/> Marque con una "X" si el Cargo por Manejo Adicional Aplica al Paquete Principal			
<input type="checkbox"/>	<b>SOBRE</b>	<input type="checkbox"/> 10KG <input type="checkbox"/> 25KG	<input type="checkbox"/> BOX <input type="checkbox"/> BOX
<b>DESCRIPCION DE LA MERCANCIA</b>			
SOLE SAMPLES			
INDIQUE SI SON SOLIDIFICADOS			
<input type="checkbox"/> <b>VALOR DECLARADO SOLO PARA TRANSPORTE (indique tipo de moneda)</b> <input type="checkbox"/> <b>VALOR DECLARADO SOLO PARA ADUANA (indique tipo de moneda)</b>			
<b>REFERENCIA N° 1</b>		<b>CANTIDAD</b>	
REFERENCIA N° 2		UNIDAD MONETARIA	

<b>6</b>	<b>PAIS DE ORIGEN (FABRICACION) DE LA MERCANCIA</b>

**1**

**N° DE CUENTA UPS DEL REMITENTE** PARA EFECTOS DE ADUANA (N° de I.V.A., ETC.)

89990000

**NOMBRE DEL REMITENTE**

MISCELLANEOUS

**N° DE TELEFONO**

(602) 491-1000 / 49151200

**NOMBRE Y DIRECCION DE LA EMPRESA**

MISCELLANEOUS SA  
 DELAWARE LOS PUEBLOS, 18 CALLE 29-01  
 T-10 CARRIZAVIAL CON LA PANORAMA  
 OF. 1000 TRENTE

**CODIGO POSTAL** PAIS

00110 GUAYAMA

**2**

**N° DE CUENTA UPS DEL CONSIGNATARIO**

N° DE ID. DEL CONSIGNATARIO PARA EFECTOS DE ADUANA (N° de ID. DEL OPERADOR, N° de I.V.A., N° de IMPORTADOR, N° de REGISTRO FEDERAL DE CONTRIBUYENTE, ETC.)

**NOMBRE DEL CONTACTO**

SATVILLAS

**N° DE TELEFONO**

970 879 690

**NOMBRE Y DIRECCION DE LA EMPRESA**

ACE LABORATORIES, INC.  
 2773 DOWNHILL DRIVE, SUITE 1000  
 SPRINGSBORO, PA

**CODIGO POSTAL** PAIS

17087 USA

**3**

**PAGO DE LOS CARGOS**

**FACTURAR CARGOS DE ENVIO A:**

REMITENTE (S)  CONSIGNATARIO (R)  TERCERO (T)

TARJETA DE CREDITO  CHEQUE  NOMBRE DE LA EMPRESA DEL TERCERO:

**FACTURAR ARANCELES E IMPUESTOS A (SI APLICAN ARANCELES):**

REMITENTE (S)  CONSIGNATARIO (R)  TERCERO (T)

**NOMBRE DE LA EMPRESA DEL TERCERO:**

**N° DE CUENTA DEL TERCERO:**

PAIS DEL TERCERO:

Guía UPS (UPS Waybill)  
N° de seguimiento

H999 7373 42

**7**

<b>FECHA DEL ENVIO</b>	<b>FIRMA DEL REMITENTE</b>
12/10/2017	[Firma]
<b>RECIBIDO PARA UPS POR:</b>	<b>FECHA:</b>
[Firma]	12/10/17
	<b>HORA:</b>
	17:17

10 + 1A 1B 1C

**12.7 Informes Originales de los Resultados Analíticos obtenidos del Efluente en los meses de Agosto a Octubre de 2017**