STATE OF COLORADO

Russell - DNR, Elliott <elliott.russell@state.co.us>

[FWD: Xanthate Report]

lbarker@aumining.net <lbarker@aumining.net> Mon, Nov 2, 2020 at 8:26 AM
To: - Russell <elliott.russell@state.co.us>

M-2014-045 TR 01
sand characterisation

> -------- Original Message --------
> Subject: Xanthate Report
> From: "Art Braun" <braunenv@msn.com>
> Date: Sat, October 31, 2020 7:09 am
> To: <lbarker@aumining.net>
>
> Lance,
>
> Here is my xanthate in the tailings report. Look it over one more time before you send it out. I am not sure that it is going to fit into their current view of dangerous chemicals.
>
> Over and out,
>
> Art

Mineral Mountain Xanthate-Tailings Investigation.pdf
3317K

Braun

Braun Environmental, Inc.

355 S. Teller St., Suite 200, Lakewood, Colorado 80226 Office: 303-697-0950 Fax: 303-697-2140

October 30, 2020 DRAFT

Lance Barker
Mineral Mountain Gold, LLC
P.O. Box 247
Cripple Creek, Colorado 80813
Dear Mr. Barker,

At your request, Braun Environmental, Inc., (Braun) inspected the material located on your waste rock pile. The work was performed to satisfy orders from the Mined Land Reclamation Board, Violation Number MV2020-021.

The Division of Reclamation and Mine Safety (DRMS) performed two site inspections this last summer season and in their July of 2020 report, noted that there was a mill inside the mine along with "mill tailings [being] dumped . . . into a 'mill tailings trench' outside." In their *Findings Of Fact, Conclusions Of Law, and Order*, document dated October 8, 2020, the directive included the following: *The Technical Revision shall also include a plan to either: a. Excavate and haul uncharacterized mill tailings off-site to an appropriate disposal facility, or b. Have a third-party sample and characterize the mill tailings to determine if they can be left in place.*

Field Investigation

Field investigations were conducted by Braun to assess the site and to characterize the material referenced by DRMS, including the determination of location of the material, the volume of material, and characteristics of that material.

The material is located along the northwestern face of the waste rock pile and appears in a shallow trench that had been cut into it. The mapping found that the trench had a total length of about 100 feet. The portion that contained the material had a length of 65 feet with an effective width ranging from 9 feet on the west to 10 feet on the east. At the western end, the material had an average thickness of 2 feet and at the eastern end had an average thickness of just over 3 feet. These measurements resulted in an average thickness of 2 feet, which was used to compute the volume. Based on these dimensions, the trench contains 57 cubic yards of material. At the east end of the trench, there was an additional oval-shaped pile having basal dimensions of about 12 feet on its north-south axis and 17 feet on its east-west axis. This pile was estimated to contain an additional seven cubic yards, resulting in a total estimated volume of material on the site of 69 cubic yards.

The material was carefully inspected in the field and had the appearance of brown sand. No visual evidence was found indicating that the material contained any metallic minerals, nor did it have any strong odors indicating that it might contain any hazardous chemicals, or in fact, volatile chemicals of any kind. It simply had the characteristics of plain brown sand. The DRMS report states that "xanthate" was used in the processing, and it has been our experience that the presence of this chemical produces a distinctive odor. During our inspection, using the olfactory senses, that distinctive odor was never detected. As part of Braun's review, the material was screened and found, by geologic definition, to consist of coarse- to fine-grained sand.

The trench bottom adjacent to the material, and the sides were inspected and no evidence was found that any excess water had migrated out of the material, as evidenced by the sides showing no erosion or staining, beyond what would be expected from the placement of wet sand. While Braun was not on site to see the material during its placement, based on the evidence collected during the inspection, it appears that material, if compared to wet concrete could be characterized as having a "4- to 6-inch slump". Concrete having that consistency would not be expected to expel any water, either. Based on Braun's observations, the characteristics of the material in the trench is unchanged from when it was originally placed, and no changes to its composition were detected, with exception of a reduction in the initial water saturation which appears to have been lost to the dry air of Colorado.

Based on the inspector's report, the material is reported to contain about 25 percent country rock, but in practice the material was mixed to approximately 50 percent. This higher estimate appears reasonable, and matches our field observations, thus the actual volume of sand-sized material contained in the trenches would be expected to be about 50 percent of the measured volume, or about 35 cubic yards. This allows an estimate to be made of how much material has been crushed and ground and equates to two large dump truck loads; which is not a very large volume of material. This calculation allows an estimate to be made of how many hours of process testing had occurred, based on the theoretical throughput of the equipment described by DRMS inspectors.

Sampling

As the DRMS directive is not specific, it was decided to be thorough and, to check for anything that the Environmental Protection Agency (EPA) and the Colorado Department Human Health and Environment (CDPHE) might consider hazardous; any compound that had any reasonable chance of being contained within the materials sampled.

RCRA Metals

Twin Environmental Services, the group that operates a Subtitle D landfill in Fremont County was brought in to sample to CDPHE standards to characterize the material for possible acceptance to their landfill. They submitted the samples to ACZ Laboratories, in Steamboat, Colorado, which were tested using EPA approved methods for the Resource Conservation and Recovery Act (RCRA) metals, and for ignitability and corrosivity. In addition, they tested for volatile organic compounds, including vinyl chloride. The RCRA metals testing showed that the material met the CDPHE standards for residential soil for all elements with exception of arsenic. Those results and comparisons are included in Table 1, which includes residential and industrial worker standards.

Table 1

Element	Concentration (mg/kg)	CDPHE Residential (mg/kg)	CDPHE Worker (mg/kg)
Arsenic	177	0.39	1.60
Barium	222	15,000	160,000
Cadmium	3	70	770
Chromium	7	120,000	1,500,000
Lead	223	400	800
Mercury	0.1	13	160
Selenium	U	390	5,100
Silver	6	390	5,100

As is commonly known, elevated arsenic concentrations in Colorado are associated directly with hydrothermal activity. While the State has developed standards for arsenic, normal arsenic background values in Colorado can be well above those set standards. The CDPHE has recognized these elevated concentrations, and is quoted in a footnote on their published standards for soils and drinking water as follows:

"For many locations in Colorado, naturally occurring concentrations of arsenic in soil are expected to be higher than the risk-based value listed in Table 1. If adequate background sampling is available that confirms the naturally occurring background concentration of arsenic adjacent to a facility is higher than the table value, the background concentration may be used for site screening and remediation purposes. Users should also reference the document 'Risk Management Guidance for Evaluating Arsenic Concentrations in Soil' (CDPHE, June 2011) at http://www.cdphe.state.co.us /hm/arsenicinsoil.pd"

Cripple Creek is typical of these areas, and the arsenic concentrations within the entire area are elevated. It is noted that the intent was to encapsulate the material within development rock, thus conforming with the goals of both CDPHE and EPA that material having elevated concentrations be isolated from the public to the degree possible. Since the site is currently considered an industrial area, only at the end of mining will it be considered for other uses and considered for the residential soil standard. The original ACZ laboratory report is attached.

TCLP

As part of the landfill acceptance procedures, ACZ Laboratories ran a Toxic Characteristic Leaching Procedure (TCLP) text to ensure that in a landfill environment, the metals would not be subject to leaching beyond what the EPA considers to be acceptable. The results from that test are shown in Table 2 and include the results along with the EPA standard.

Table 2

Element	Concentration (mg/kg)	EPA RCRA Standard (mg/kg)
Arsenic	U	5.00
Barium	0.3	100
Cadmium	0.0107	1
Chromium	U	5
Lead	0.032	5
Mercury	U	0.2
Selenium	U	1
Silver	U	5

The results of this test indicates that the material passes the TCLP test and shows that it is not prone to leaching of metals, either in a landfill, nor if left in place at this site. The results of the laboratory test correlate well with experience and observations within the general Cripple Creek area, where no evidence can be found of any significant metals migration at any of the old mine waste rock piles scattered throughout the district that have similar lithologies. This lack of mobility is partly due to the specific mineral assemblages and partly the result of the acid neutralizing capability of the rock found within the district. The original ACZ laboratory report is attached.

Volatile Organic Compounds

The material was tested for volatile organic compounds using EPA Method 8260, and no detectable concentrations of any of the target compounds were found. This test rules out the possibility of the

material containing any of the standard organic compounds that EPA and CDPHE considers to be hazardous. Reproduction of the results in a table is lengthy, and the original ACZ laboratory report is attached. It should be noted that while potassium ethyl xanthate is a volatile compound, neither the EPA nor CDPHE consider it to be hazardous, thus they have never believed it important to develop a test for something they consider to be non-hazardous and generally benign in the environment.

Xanthate

Per the instructions given by DRMS personnel, and even though no approved test exists to directly detect xanthate, DRMS still ordered the operator to prove its presence or absence, and as a result significant research and effort was expended trying to detect or rule out its presence. Although the olfactory test has always been a fairly good indicator, Braun, in conjunction with laboratories that it works with and CDPHE, concluded that the presence of xanthate could be identified by looking at its decomposition products. One option was discussed by Lauren Duncan, during the Board meeting on August 19, 2020, where she talked about carbon disulfide and how it degrades. Analysis of her line of reasoning finds that the single carbon atom remaining after the sulfur atoms separate cannot be differentiated from any other carbon atom in the environment. Thus, looking for that carbon atom would not lead to any success. Similarly, the two sulfur atoms tied to it could not be differentiated from the natural sulfur that occurs in the environment since the natural concentrations are so large. As a review, the average crustal abundance of sulfur is around 400 parts per million (ppm), thus the compound xanthate would have to be present in significantly higher concentrations to allow any meaningful quantitative analysis. This xanthate compound also contains potassium. However, since potassium is a major component of the natural rock forming minerals in the district, it is also of no use to the chemist attempting to calculate xanthate concentrations.

This leaves only the remaining part of the decomposing molecule, the ethane portion, referred to in the compound's complete proper name. Since this compound degrades easily, the ethane component will break off upon heating and, if present, can be detected. By quantifying the concentration of ethane detected, the concentration of xanthate can then be derived. Through a group effort, it was concluded that EPA Method RSK 175 Modified, a method to test for ethane, would be suitable. Two samples were collected from the trench area and submitted to SGS Laboratories in Wheat Ridge, Colorado using Braun's standard collection and chain of custody procedures. The laboratory found no detectable concentrations of ethane in either sample. Since detectable concentrations of ethane were absent, it must be concluded that detectable concentrations of the xanthate molecule are also absent.

Braun review of the laboratory results found them to be consistent with the conditions observed on the site. First, as Elliot Russell discussed during the Board meeting on August 19, 2020, xanthate is used specifically as a collector for the materials that the operator is interested in retaining. While he was not completely technically correct in his discussion, he went on to explain that the compound adheres to the materials to be retained, allowing them to be floated to the surface where they are then collected. These materials of interest to the operator occur in parts per million concentrations, so the xanthate is also used in parts per million concentrations. If the process were 100 percent efficient, one hundred percent of the xanthate that had been added to the process would be retained in the collected materials, and none would remain in the material sent to the trench. In practice there would be expected to be some loss in the process, so some of the reagent is likely to have found its way into the material in the trench. However, at a typical initial concentration of 20 ppm, with the majority of the chemical adhering to the retained materials, the concentration anticipated to remain in the spent material would only be a couple parts per million. Theoretically, even if the entire amount of reagent were to be lost to the spent material, the highest concentration possible would be only 20 ppm.

Not discussed by Mr. Russell during the meeting, and only discussed peripherally by Ms. Duncan, this compound, while considered stable for hazard analysis purposes, tends to degrade rather rapidly. In fact, the compound can degrade during storage, and when it is mixed and not used in a timely manner, it can degrade to the point that it will no longer serve its intended purpose. Thus, this chemical has a very short life, with the anion portion degrading into ethane and carbon disulfide. The decomposition product carbon disulfide also has a very short life and rapidly degrades further to create sulfur in either gas or solid form, depending on the environment in which it is deposited. Since the compound's life is so short and the concentrations used so small, it would be expected that the samples collected from the trench would contain no remaining detectable xanthate concentrations simply based on a remedial knowledge of the chemistry.

ABA Testing

While not discussed directly during the technical portion of the Board meeting on August 19, 2020, acid-based accounting (ABA) testing also needs to be considered, and this testing was performed prior to issuance of the 110(d) permit. The sample collection and testing results were documented in a report prepared by Braun and the results were thoroughly discussed by the operator, the consultant, and DRMS personnel following completion of that report. The results of the testing showed that the acid base potential ranges from neutral in the material that was to be mined to acid neutralizing in non-mineralized country rock. The rock that has been processed is the same material that was characterized prior to the issuance of the permit, thus neutral or near-neutral rock placed within neutralizing rock is not considered to be acid generating. Once again, these test results are generally confirmed by the close inspection of the greater than 100-year old waste rock piles that lay scattered across the district, and the fact that those piles are basically in nearly the same condition as they were when first placed. It is easy to observe that there has been no significant migration of elements off of them, nor has any chemical degradation negatively affected the flora located immediately adjacent. The material that has been processed has been characterized, and Braun sees no reason at this time that any further testing be necessary. A copy of that report is attached.

Discussion and Conclusions

In summary, per DRMS orders, Braun completed an investigation of the material that was placed in the trench on the face of the waste rock pile. Braun found a total of 69 cubic yards of material had been placed in the trench, of which, about 34 cubic yards consisted of development rock, and 35 cubic yards consisted of sand-sized particles sourced from processing. The material was tested by local laboratories, using EPA approved methods, for both organic and inorganic compounds, and specifically tested for xanthate decomposition products. The only exceedance over any of the standards was for arsenic, and its presence and relation to environmental regulations has been discussed above.

These most recent test results are all consistent with initial testing that was performed prior to obtaining the 110(d) permit, and also with the principles of basic chemistry. Once again, no detectable concentrations of xanthate were found in the materials sampled, and since the compound is not considered hazardous by either EPA or CDPHE, even if a small amount would have been found to be present, neither of these two agencies would have concern in that any regulatory standards would have been exceeded. The only significant potential environmental concern regarding this compound by EPA and CDPHE is the potential danger to freshwater fish, and they were specifically interested if this might have been the reason why DRMS has made this compound an issue. The permitted mine site is not in any proximity to surface waters that might contain fish, and the nearest water that might contain fish would be several miles away from this high and dry location. If the assumption were made that fish might present near the site, review of the ecotoxicity data for freshwater fish the LC50 96-hr, has been determined to be 15 to 25 milligrams per liter (mg/L), and at that limit, if the concentration used in the process were to be reduced

by 50 percent, fresh water fish could live in the xanthate concentrations used within the process. Thus, there would not be a conceivable way that xanthate concentrations contained within the material in the trench could be anywhere near this concentration, and it would logically follow, that even lower concentrations would result if leaching would occur, even if the compound's rapid degradation rates were ignored.

It is Braun's professional opinion that the material in the trench is nonhazardous and poses no threat to human health or the environment. Therefore, per current applicable environmental laws and regulations, it may either be left in place or may be hauled to a landfill, since it meets CDPHE standards for both scenarios.

Braun does recommend that if the choice to haul to a landfill is selected, some thought be put into the decision, since based on all historic testing, the composition of the trench material is essentially the same as the nearby non-disturbed material. Transport of the material off of the mine site would not materially change the environmental condition of the mine site, and its transport to a landfill would be considered to have a negative effect on the Earth's environment when fossil fuel use is considered with respect to climate change and global warming. The unnecessary hauling of the material over public roads, additionally would create an increased in danger to humans and wildlife that might be using those roads while transport were occurring.

You are welcome to call me with any questions and I would be happy to discuss the basic chemistry and the results of our investigation in more detail with anyone else that might be interested.

Sincerely,
BRAUN ENVIRONMENTAL, INC.

C. A. Braun, P.E.
enc.
CAB/rl

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

September 29, 2020

Report to:
Chris Brochu
Twin Enviro Services
P.O. Box 774362
Steamboat Springs, CO 80477

cc: Rick McCalla, Les Liman

Bill to:
Deb Beaumont
Twin Enviro
2500 CR 67
Penrose, CO 81240

Project ID: Barkes
ACZ Project ID: L61266

Chris Brochu:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on September 03, 2020. This project has been assigned to ACZ's project number, L61266. 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 L61266. 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, 2020. 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.

Twin Enviro Services
Project ID: Barkes
Sample ID: BARKER

ACZ Sample ID: ***L61266-01***
Date Sampled: *09/02/20 09:00*
Date Received: *09/03/20*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6010D ICP	200	177		*	mg/Kg	8	40	09/17/20 22:32	jlw
Barium, total (3050)	M6010D ICP	200	222			mg/Kg	1	7	09/17/20 22:32	jlw
Cadmium, total (3050)	M6010D ICP	200	3	B	*	mg/Kg	2	5	09/17/20 22:32	jlw
Chromium, total (3050)	M6010D ICP	200	7	B	*	mg/Kg	2	10	09/17/20 22:32	jlw
Lead, total (3050)	M6010D ICP	200	223			mg/Kg	6	30	09/17/20 22:32	jlw
Mercury, total	M7471A CVAA	211	0.10	B	*	mg/Kg	0.04	0.2	09/16/20 15:20	jlw/llr
Selenium, total (3050)	M6010D ICP	200		U		mg/Kg	10	50	09/17/20 22:32	jlw
Silver, total (3050)	M6010D ICP	200	6			mg/Kg	2	5	09/17/20 22:32	jlw

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Ignitability in Solids	M1030	1	Not Flammable		*				09/15/20 12:30	gkh
pH, Corrosivity	M9045D/M9040C									
pH		1	5.3			units	0.1	0.1	09/16/20 0:00	mlp
Temperature		1	22.1			C	0.1	0.1	09/16/20 0:00	mlp
Solids, Percent	D2216-80	1	91.8		*	%	0.1	0.5	09/09/20 16:00	krs
Total Solids	SM2540B	1	91.1		*	%	0.1	0.5	09/04/20 10:15	gkh

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	M3050B ICP								09/16/20 9:30	krs

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	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:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Twin Enviro Services

ACZ Project ID: ***L61266***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L61266-01	WG505309	Arsenic, total (3050)	M6010D ICP	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.
		Cadmium, total (3050)	M6010D ICP	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.
		Chromium, total (3050)	M6010D ICP	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.
	WG505223	Mercury, total	M7471A CVAA	Q6	Sample was received above recommended temperature.
	WG504630	Total Solids	SM2540B	Q6	Sample was received above recommended temperature.

Twin Enviro Services
Project ID: Barkes
Sample ID: BARKER

ACZ Sample ID: ***L61266-01***
Date Sampled: *09/02/20 9:00*
Date Received: *09/03/20*
Sample Matrix: *Soil*

Volatile Organics by GC/MS

Analysis Method: **M8260C/D GC/MS**
Extract Method: **5035A**

Workgroup: WG505261
Analyst: jmm
Extract Date: 09/16/20 19:52
Analysis Date: 09/16/20 19:52

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
1,1,1,2-Tetrachloroethane	630-20-6		U	2	*	ug/Kg	8	20
1,1,1-Trichloroethane	71-55-6		U	2	*	ug/Kg	20	50
1,1,2,2-Tetrachloroethane	79-34-5		U	2	*	ug/Kg	6	20
1,1,2-Trichloroethane	79-00-5		U	2	*	ug/Kg	8	20
1,1-Dichloroethane	75-34-3		U	2	*	ug/Kg	8	20
1,1-Dichloroethene	75-35-4		U	2	*	ug/Kg	8	20
1,1-Dichloropropene	563-58-6		U	2	*	ug/Kg	8	20
1,2,3-Trichlorobenzene	87-61-6		U	2	*	ug/Kg	8	20
1,2,3-Trichloropropane	96-18-4		U	2	*	ug/Kg	8	20
1,2,4-Trichlorobenzene	120-82-1		U	2	*	ug/Kg	6	20
1,2,4-Trimethylbenzene	95-63-6		U	2	*	ug/Kg	8	20
1,2-Dibromo-3-chloropropane	96-12-8		U	2	*	ug/Kg	8	20
1,2-Dibromoethane	106-93-4		U	2	*	ug/Kg	8	20
1,2-Dichlorobenzene	95-50-1		U	2	*	ug/Kg	8	20
1,2-Dichloroethane	107-06-2		U	2	*	ug/Kg	8	20
1,2-Dichloropropane	78-87-5		U	2	*	ug/Kg	8	20
1,3,5-Trimethylbenzene	108-67-8		U	2	*	ug/Kg	8	20
1,3-Dichlorobenzene	541-73-1		U	2	*	ug/Kg	8	20
1,3-Dichloropropane	142-28-9		U	2	*	ug/Kg	8	20
1,4-Dichlorobenzene	106-46-7		U	2	*	ug/Kg	8	20
2,2-Dichloropropane	594-20-7		U	2	*	ug/Kg	8	20
2-Butanone	78-93-3		U	2	*	ug/Kg	20	50
2-Chloroethyl vinyl ether	110-75-8		U	2	*	ug/Kg	10	50
2-Chlorotoluene	95-49-8		U	2	*	ug/Kg	8	20
2-Hexanone	591-78-6		U	2	*	ug/Kg	20	50
4-Chlorotoluene	106-43-4		U	2	*	ug/Kg	8	20
4-Isopropyltoluene	99-87-6		U	2	*	ug/Kg	8	20
4-Methyl-2-Pentanone	108-10-1		U	2	*	ug/Kg	20	100
Acetone	67-64-1		U	2	*	ug/Kg	20	50
Acrylonitrile	107-13-1		U	2	*	ug/Kg	8	20
Benzene	71-43-2		U	2	*	ug/Kg	8	20
Bromobenzene	108-86-1		U	2	*	ug/Kg	8	20
Bromochloromethane	74-97-5		U	2	*	ug/Kg	8	20
Bromodichloromethane	75-27-4		U	2	*	ug/Kg	8	20
Bromoform	75-25-2		U	2	*	ug/Kg	8	20
Bromomethane	74-83-9		U	2	*	ug/Kg	8	20
Carbon Disulfide	75-15-0		U	2	*	ug/Kg	8	20
Carbon Tetrachloride	56-23-5		U	2	*	ug/Kg	20	50

Twin Enviro Services
Project ID: Barkes
Sample ID: BARKER

ACZ Sample ID: ***L61266-01***
Date Sampled: *09/02/20 9:00*
Date Received: *09/03/20*
Sample Matrix: *Soil*

Chlorobenzene	108-90-7		U	2	*	ug/Kg	8	20
Chloroethane	75-00-3		U	2	*	ug/Kg	8	20
Chloroform	67-66-3		U	2	*	ug/Kg	8	20
Chloromethane	74-87-3		U	2	*	ug/Kg	8	20
cis-1,2-Dichloroethene	156-59-2		U	2	*	ug/Kg	8	20
cis-1,3-Dichloropropene	10061-01-5		U	2	*	ug/Kg	8	20
Dibromochloromethane	124-48-1		U	2	*	ug/Kg	8	20
Dibromomethane	74-95-3		U	2	*	ug/Kg	8	20
Dichlorodifluoromethane	75-71-8		U	2	*	ug/Kg	10	30
Ethylbenzene	100-41-4		U	2	*	ug/Kg	8	20
Hexachlorobutadiene	87-68-3		U	2	*	ug/Kg	8	20
Isopropylbenzene	98-82-8		U	2	*	ug/Kg	8	20
m p Xylene	1330-20-7		U	2	*	ug/Kg	20	50
Methyl Tert Butyl Ether	1634-04-4		U	2	*	ug/Kg	8	20
Methylene Chloride	75-09-2		U	2	*	ug/Kg	8	20
Naphthalene	91-20-3		U	2	*	ug/Kg	8	20
n-Butylbenzene	104-51-8		U	2	*	ug/Kg	8	20
n-Propylbenzene	103-65-1		U	2	*	ug/Kg	8	20
o Xylene	95-47-6		U	2	*	ug/Kg	8	20
sec-Butylbenzene	135-98-8		U	2	*	ug/Kg	8	20
Styrene	100-42-5		U	2	*	ug/Kg	8	20
tert-Butylbenzene	98-06-6		U	2	*	ug/Kg	8	20
Tetrachloroethene	127-18-4		U	2	*	ug/Kg	8	20
Toluene	108-88-3		U	2	*	ug/Kg	8	20
trans-1,2-Dichloroethene	156-60-5		U	2	*	ug/Kg	8	20
trans-1,3-Dichloropropene	10061-02-6		U	2	*	ug/Kg	6	20
Trichloroethene	79-01-6		U	2	*	ug/Kg	10	30
Trichlorofluoromethane	75-69-4		U	2	*	ug/Kg	8	20
Vinyl Acetate	108-05-4		U	2	*	ug/Kg	8	20
Vinyl Chloride	75-01-4		U	2	*	ug/Kg	8	20
Surrogate Recoveries	**CAS**	**% Recovery**		**Dilution**	**XQ**	**Units**	**LCL**	**UCL**
Bromofluorobenzene	460-00-4	92.1		2	*	%	70	130
Dibromofluoromethane	1868-53-7	101.2		2	*	%	70	130
Toluene-d8	2037-26-5	91.6		2	*	%	70	130

Report Header Explanations

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

QC Sample Types

SURR	Surrogate	*LFB*	Laboratory Fortified Blank
INTS	Internal Standard	*LFM*	Laboratory Fortified Matrix
AS	Analytical Spike (Post Digestion)	*LFMD*	Laboratory Fortified Matrix Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LRB*	Laboratory Reagent Blank
DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	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)

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:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L61266-01	WG505261	*All Compounds*	M8260C/D GC/MS	Q6	Sample was received above recommended temperature.
		1,1,1,2-Tetrachloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,1,1-Trichloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,1,2,2-Tetrachloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,1,2-Trichloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,1-Dichloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,1-Dichloroethene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,1-Dichloropropene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2,3-Trichlorobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	N1A	See Case Narrative.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2,3-Trichloropropane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2,4-Trichlorobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	VC	CCV recovery was above the acceptance limits. Target analyte was not detected in the sample [< MDL].
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2,4-Trimethylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2-Dibromo-3-chloropropane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2-Dibromoethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2-Dichlorobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
					does not have a closed-system purge and trap as described in method 5035.
		1,2-Dichloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,2-Dichloropropane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,3,5-Trimethylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,3-Dichlorobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,3-Dichloropropane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		1,4-Dichlorobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		2,2-Dichloropropane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		2-Butanone	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		2-Chloroethyl vinyl ether	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		2-Chlorotoluene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		2-Hexanone	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		4-Chlorotoluene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		4-Isopropyltoluene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		4-Methyl-2-Pentanone	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Acetone	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Acrylonitrile	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Benzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Bromobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Bromochloromethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Bromodichloromethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Bromoform	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Bromomethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Carbon Disulfide	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Carbon Tetrachloride	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Chlorobenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Chloroethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Chloroform	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Chloromethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		cis-1,2-Dichloroethene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		cis-1,3-Dichloropropene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Dibromochloromethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Dibromomethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Dichlorodifluoromethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	N1	See Case Narrative.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Ethylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Hexachlorobutadiene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Isopropylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		m p Xylene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Methyl Tert Butyl Ether	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Methylene Chloride	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Naphthalene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	VC	CCV recovery was above the acceptance limits. Target analyte was not detected in the sample [< MDL].
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		n-Butylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L61266-01	WG505261	n-Propylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		o Xylene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		sec-Butylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Styrene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		tert-Butylbenzene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Tetrachloroethene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Toluene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		trans-1,2-Dichloroethene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		trans-1,3-Dichloropropene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Trichloroethene	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Trichlorofluoromethane	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	R4	RPD for a spike and spike duplicate exceeded the method or laboratory acceptance limit. At a minimum, one spike recovery met acceptance criteria.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Vinyl Acetate	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.
			M8260C/D GC/MS	M2	Matrix spike recovery was low, the recovery of the associated control sample (LCS or LFB) was acceptable.
			M8260C/D GC/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.
			M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.
		Vinyl Chloride	M8260C/D GC/MS	DD	Sample required dilution due to matrix color or odor.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Organic Extended Qualifier Report

ACZ Project ID: ***L61266***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L61266-01	WG505261	Vinyl Chloride	M8260C/D GC/MS	ZM	Data is estimated because result is below 200 ug/Kg; ACZ does not have a closed-system purge and trap as described in method 5035.

Twin Enviro Services

ACZ Project ID: ***L61266***

Soil Analysis

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

Ignitability in Solids	M1030
Solids, Percent	D2216-80
Total Solids	SM2540B

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Twin Enviro Services
Barkes

ACZ Project ID: L61266
Date Received: 09/03/2020 11:46
Received By:
Date Printed: 9/4/2020

Receipt Verification

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

Samples/Containers

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

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?
NA33550	10.1	<=6.0	15	Yes

Was ice present in the shipment container(s)?

Yes - Wet ice was 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.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Twin Enviro Services
Barkes

ACZ Project ID: L61266
Date Received: 09/03/2020 11:46
Received By:
Date Printed: 9/4/2020

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

ACZ Laboratories, Inc. L61266

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

CHAIN of CUSTODY

Report to:

Name: Chris Brochu	Address:
Company: Twin Envito	
E-mail: cbrochu@twinenvito.com	Telephone: 719-372-6671

Copy of Report to:

Name: Rick McCalla	E-mail: rmccalla@twinenvito.com
Company:	Telephone:

Invoice to:

Name: Debbie Beaumont	Address:
Company:	
E-mail: dbeaumont@twinenvito.com	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 [X] 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 [X]

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

Sampler's Name: Rick McCalla **Sampler's Site Information** **State** Co **Zip code** 81240 **Time Zone** MTN

***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

Quote #:

PO#: Barker

Reporting state for compliance testing:

Check box if samples include NRC licensed material?

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	RCRA 8 metals	VOAs by SW 846	Ignitability	pH					
Barker	9-2-20 900	SO	3	/	/	/	/					

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

MARKS

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

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
Rick McCalla	9-2-20 1900 RM	[signature] 9/3/20	1126

L61266 Chain of Custod

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

October 13, 2020

Report to:
Chris Brochu
Twin Enviro Services
P.O. Box 774362
Steamboat Springs, CO 80477

cc: Rick McCalla, Les Liman

Bill to:
Deb Beaumont
Twin Enviro
2500 CR 67
Penrose, CO 81240

Project ID:
ACZ Project ID: L61935

Chris Brochu:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 06, 2020. This project has been assigned to ACZ's project number, L61935. 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 L61935. 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 12, 2020. 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.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Case Narrative

Twin Enviro Services

October 13, 2020

Project ID:
ACZ Project ID: L61935

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 1 miscellaneous sample from Twin Enviro Services on October 6, 2020. 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 L61935. 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 Mercury flagged with an "H1". The sample was re-logged after the hold time had expired.

Sample Analysis

This sample was 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. Barium (TCLP) (B1) - Barium detected in prep blank at or above the method reporting limit. Trace levels are present in extraction reagents.

Twin Enviro Services
Project ID:
Sample ID: BARKER

ACZ Sample ID: ***L61935-01***
Date Sampled: *09/02/20 09:00*
Date Received: *10/06/20*
Sample Matrix: *Soil*

Inorganic Prep

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M3010A ICP								10/09/20 16:19	jlw

Metals Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Arsenic (TCLP)	M6010D ICP	1	<0.04	U	*	mg/L	0.04	0.2	10/12/20 22:15	kja
Barium (TCLP)	M6010D ICP	1	0.300		*	mg/L	0.007	0.035	10/12/20 22:15	kja
Cadmium (TCLP)	M6010D ICP	1	0.0107	B	*	mg/L	0.008	0.025	10/12/20 22:15	kja
Chromium (TCLP)	M6010D ICP	1	<0.01	U	*	mg/L	0.01	0.05	10/12/20 22:15	kja
Lead (TCLP)	M6010D ICP	1	0.032	B	*	mg/L	0.03	0.15	10/12/20 22:15	kja
Mercury (TCLP)	M7470A CVAA	1	<0.0002	UH	*	mg/L	0.0002	0.001	10/08/20 15:59	llr
Selenium (TCLP)	M6010D ICP	1	<0.05	U	*	mg/L	0.05	0.25	10/12/20 22:15	kja
Silver (TCLP)	M6010D ICP	1	<0.01	U	*	mg/L	0.01	0.025	10/12/20 22:15	kja

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
TCLP Metal Extraction	M1311								10/07/20 10:45	mlp

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Reference

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit unless omitted or equal to the PQL (see comment #5). Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit. Synonymous with the EPA term "minimum level".
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	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:
https://acz.com/wp-content/uploads/2019/04/Ext-Qual-List.pdf

REP001.03.15.02

Twin Enviro Services

ACZ Project ID: ***L61935***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Arsenic (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	4		3.872	mg/L	97	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.12	0.12			
WG506692PBS	PBS	10/12/20 21:43				U	mg/L		-0.12	0.12			
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	1.001		1.06	mg/L	106	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	1.001	U	1.042	mg/L	104	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	1.001	U	1.064	mg/L	106	75	125	2	20	
L61895-01DUP	DUP	10/12/20 22:03			U	U	mg/L				0	20	RA

Barium (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	2		1.954	mg/L	98	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.021	0.021			
WG506692PBS	PBS	10/12/20 21:43				.0335	mg/L		-0.021	0.021			B1
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	20.5		19.75	mg/L	96	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	20.5	.0965	20.22	mg/L	98	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	20.5	.0965	20.23	mg/L	98	75	125	0	20	
L61895-01DUP	DUP	10/12/20 22:03			.0965	.1546	mg/L				46	20	RD

Cadmium (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	2		1.921	mg/L	96	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.024	0.024			
WG506692PBS	PBS	10/12/20 21:43				U	mg/L		-0.024	0.024			
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	.501		.4951	mg/L	99	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	.501	U	.4905	mg/L	98	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	.501	U	.4888	mg/L	98	75	125	0	20	
L61895-01DUP	DUP	10/12/20 22:03			U	U	mg/L				0	20	RA

Chromium (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	2		1.942	mg/L	97	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.03	0.03			
WG506692PBS	PBS	10/12/20 21:43				U	mg/L		-0.03	0.03			
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	.501		.501	mg/L	100	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	.501	U	.497	mg/L	99	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	.501	U	.499	mg/L	100	75	125	0	20	
L61895-01DUP	DUP	10/12/20 22:03			U	U	mg/L				0	20	RA

Twin Enviro Services

ACZ Project ID: ***L61935***

NOTE: If the Rec% column is null, the high/low limits are in the same units as the result. If the Rec% column is not null, then the high/low limits are in % Rec.

Lead (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	4		3.887	mg/L	97	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.09	0.09			
WG506692PBS	PBS	10/12/20 21:43				U	mg/L		-0.09	0.09			
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	1.001		1.006	mg/L	100	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	1.001	U	.986	mg/L	99	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	1.001	U	.999	mg/L	100	75	125	1	20	
L61895-01DUP	DUP	10/12/20 22:03			U	U	mg/L				0	20	RA

Mercury (TCLP) M7470A CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG506747													
WG506747ICV	ICV	10/08/20 14:05	HG200810-2	.005		.00481	mg/L	96	95	105			
WG506747ICB	ICB	10/08/20 14:06				U	mg/L		-0.0002	0.0002			
WG506839													
WG506839PBW	PBW	10/08/20 15:52				U	mg/L		-0.00044	0.00044			
WG506692PBS	PBS	10/08/20 15:53				U	mg/L		-0.0006	0.0006			
WG506692LFB	LFB	10/08/20 15:54	HG200918-3	.002002		.00173	mg/L	86	85	115			
L61895-01MS	MS	10/08/20 15:56	HG200918-3	.002002	U	.0017	mg/L	85	85	115			
L61895-01MSD	MSD	10/08/20 15:57	HG200918-3	.002002	U	.00172	mg/L	86	85	115	1	20	
L61895-01DUP	DUP	10/08/20 15:58			U	U	mg/L				0	20	RA

Selenium (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	4		3.986	mg/L	100	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.15	0.15			
WG506692PBS	PBS	10/12/20 21:43				U	mg/L		-0.15	0.15			
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	1.001		1.048	mg/L	105	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	1.001	U	1.049	mg/L	105	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	1.001	U	1.062	mg/L	106	75	125	1	20	
L61895-01DUP	DUP	10/12/20 22:03			U	U	mg/L				0	20	RA

Silver (TCLP) M6010D ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec%	Lower	Upper	RPD	Limit	Qual
WG507084													
WG507084ICV	ICV	10/12/20 21:15	II201009-1	1		1.014	mg/L	101	90	110			
WG507084ICB	ICB	10/12/20 21:19				U	mg/L		-0.03	0.03			
WG506692PBS	PBS	10/12/20 21:43				U	mg/L		-0.03	0.03			
WG506692LFB	LFB	10/12/20 21:47	IITCLPSPIKE	.501		.488	mg/L	97	80	120			
L61895-01MS	MS	10/12/20 21:55	IITCLPSPIKE	.501	U	.488	mg/L	97	75	125			
L61895-01MSD	MSD	10/12/20 21:59	IITCLPSPIKE	.501	U	.493	mg/L	98	75	125	1	20	
L61895-01DUP	DUP	10/12/20 22:03			U	U	mg/L				0	20	RA

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Extended Qualifier Report

Twin Enviro Services

ACZ Project ID: ***L61935***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L61935-01	WG507084	Arsenic (TCLP)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Barium (TCLP)	M6010D ICP	B1	Target analyte detected in prep / method blank at or above the method reporting limit. See Case Narrative.
			M6010D ICP	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.
		Cadmium (TCLP)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Chromium (TCLP)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Lead (TCLP)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG506839	Mercury (TCLP)	M7470A CVAA	H1	Sample prep or analysis performed past holding time. See case narrative.
			M7470A CVAA	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
	WG507084	Selenium (TCLP)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).
		Silver (TCLP)	M6010D ICP	RA	Relative Percent Difference (RPD) was not used for data validation because the concentration of the duplicated sample is too low for accurate evaluation (< 10x MDL).

Certification Qualifiers

Twin Enviro Services

ACZ Project ID: ***L61935***

No certification qualifiers associated with this analysis

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Twin Enviro Services

ACZ Project ID: L61935
Date Received: 10/06/2020 09:00
Received By:
Date Printed: 10/6/2020

Receipt Verification

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

Samples/Containers

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

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?
UNKNOWN		<=6.0		

Was ice present in the shipment container(s)?

Yes - Wet ice was 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.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Twin Enviro Services

ACZ Project ID:	L61935
Date Received:	10/06/2020 09:00
Received By:	
Date Printed:	10/6/2020

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

L61935 Re-Log

ACZ Laboratories, Inc. ~~L61266~~ JJ 10/6/20

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

CHAIN of CUSTODY

Report to:

Name: Chris Brochu	Address:
Company: Twin Envito	
E-mail: cbrochu@twinenvito.com	Telephone: 719-372-6671

Copy of Report to:

Name: Rick McCalla	E-mail: rmccalla@twinenvito.com
Company:	Telephone:

Invoice to:

Name: Debbie Beaumont	Address:
Company:	
E-mail: dbeaumont@twinenvito.com	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 [X] 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 [X]

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

Sampler's Name: Rick McCalla **Sampler's Site Information** State Co Zip code 81240 Time Zone MTN

***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

Quote #:

PO#: Barker

Reporting state for compliance testing:

Check box if samples include NRC licensed material? [ ]

ANALYSES REQUESTED (attach list or use quote number)

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	RCRA 8 Metals	VOA's by SW 846	Ignitability	PH				
Barker	9-2-20 900	SO	3	✓	✓	✓	✓				

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
Rick McCalla	9-2-20 1900 RM	[signature] 9/3/20	1136

L61935 Chain of Custod

FRMAD050.06.14.14 White - Return with sample. Yellow - Retain for your records.

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Braun Environmental, Inc.

MM-01

SGS Job Number: DA28704

Sampling Date: 09/08/20

Report to:

Braun Environmental, Inc.
355 South Teller Street Suite 200
Lakewood, CO 80226
braunenv@msn.com

ATTN: Art Braun

Total number of pages in report: **31**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Jason Savoie
General Manager

Client Service contact: Elizabeth Sutcliffe 303-425-6021

Certifications: CO (CO00049), NE (NE-OS-06-04), ND (R-027), UT (NELAP CO00049) LA (LA150028), TX (T104704511), WY (8TMS-L)

Sections: 1 2 3 4 5 6 7

Table of Contents

Sample Summary

Braun Environmental, Inc.

Job No: DA28704

MM-01

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
This report contains results reported as ND = Not detected. The following applies:							
Organics ND = Not detected above the MDL							
DA28704-1	09/08/20	08:17	AB	09/08/20	AQ	Ground Water	090820-1
DA28704-2	09/08/20	09:26	AB	09/08/20	AQ	Ground Water	090820-2

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Braun Environmental, Inc.	**Job No:**	DA28704
Site:	MM-01	**Report Date**	9/17/2020 1:27:34 PM

On 09/08/2020, 2 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at SGS North America Inc. (SGS) at a temperature of 5.3 °C. The samples were intact and properly preserved, unless noted below. An SGS Job Number of DA28704 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

GC Volatiles By Method RSK175 MOD

Matrix: AQ **Batch ID:** GFK118

- All samples were analyzed within the recommended method holding time.
- Sample(s) DA19422-5MS, DA19422-5MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

SGS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting SGS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

SGS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by SGS indicated via signature on the report cover.

Summary of Hits

Job Number: DA28704
Account: Braun Environmental, Inc.
Project: MM-01
Collected: 09/08/20

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
DA28704-1	**090820-1**					
No hits reported in this sample.						
DA28704-2	**090820-2**					
No hits reported in this sample.						

Sample Results

Report of Analysis

SGS North America Inc.

Report of Analysis

Client Sample ID:	090820-1		
Lab Sample ID:	DA28704-1	**Date Sampled:**	09/08/20
Matrix:	AQ - Ground Water	**Date Received:**	09/08/20
Method:	RSK175 MOD	**Percent Solids:**	n/a
Project:	MM-01		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FK1687.D	1	09/09/20 14:41	JB	n/a	n/a	GFK118
Run #2							

	Initial Volume	Headspace Volume	Volume Injected	Temperature
Run #1	39.0 ml	4.0 ml	500 ul	20.5 Deg. C
Run #2				

CAS No.	Compound	Result	RL	MDL	Units	Q
74-84-0	Ethane	ND	0.0016	0.0010	mg/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS North America Inc.

Report of Analysis

Client Sample ID:	090820-2		
Lab Sample ID:	DA28704-2	**Date Sampled:**	09/08/20
Matrix:	AQ - Ground Water	**Date Received:**	09/08/20
Method:	RSK175 MOD	**Percent Solids:**	n/a
Project:	MM-01		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FK1688.D	1	09/09/20 14:50	JB	n/a	n/a	GFK118
Run #2							

	Initial Volume	Headspace Volume	Volume Injected	Temperature
Run #1	39.0 ml	4.0 ml	500 ul	20.5 Deg. C
Run #2				

CAS No.	Compound	Result	RL	MDL	Units	Q
74-84-0	Ethane	ND	0.0016	0.0010	mg/l	

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

CHAIN OF CUSTODY

SGS North America Inc. - Wheat Ridge
4036 Youngfield Street, Wheat Ridge, CO 80033
TEL: 303-425-6021 FAX: 303-425-6854
www.sgs.com/ehsusa

Bottle Order Control #	FED-EX Tracking #
SGS Quote #	SGS Job #: DA28704

Client / Reporting Information

Company: Brown Environmental Inc
Street: 3555 Teller Ste 200
City, State: Lakewood CO 80226
Project Contact: Art Brown
Phone: 303-988-7697
Email: brownenvp.msn.com
Sampler(s) Name(s): AB

Project Information

Project Name: MM-01
Street:
City, State:
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)

Company:
Street Address:
City, State ZIP:
Attention:

Requested Analysis (see TEST CODE sheet)

RSK-175 Method - Ethane

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB-Equipment Blank
RB - Rinse Blank
TB - Trip Blank

Field ID / Point of Collection	Collection Date	Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: NONE	HCl	NaOH	HNO3	H2SO4	DI Water	MEOH	ENCORE	Na2S2O3	NaZSO3	RSK-175 Method - Ethane	LAB USE ONLY
090820-1	9/8/20	8:17A	AB	GW	4											X	01
090820-2	9/8/20	9:26A	AB	GW	4											X	02

Turnaround Time (Business days)

- [x] Standard 10 Business Days
- [ ] 5 Business Days RUSH
- [ ] 3 Business Days RUSH
- [ ] 2 Business Days RUSH
- [ ] 1 Business Day EMERGENC

Special Reporting Instructions
- [ ] Report in PPB
- [ ] Report in PPM
- [ ] Report MDLs

Emergency & Rush T/A data available via LabLink. RUSH TAT approval needed.

Data Deliverable Information

- [ ] Commercial "A" (Level 1, Results Only)
- [ ] Commercial "B" (Level 2, Results + QC Summary)
- [ ] COMMBN (Results/QC/Narrative)
- [ ] COMMBN+ [Results/QC/Narrative (+ chromatograms)]
- [ ] REDT2
- [ ] FULT1
- [ ] EDD Format

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler: 1	Date/Time: 9/8/20 1450	Received By: 1	Relinquished By: 2	Date/Time:	Received By: 2
Relinquished by Sampler: 3	Date/Time:	Received By: 3	Relinquished By: 4	Date/Time:	Received By: 4

Custody Seal # Intact [x] Not Intact [ ] Absent [ ]
Preserved where applicable [x] Cooler Temp. °C: 5.3 Therm. ID: T010 On Ice [x]

http://www.sgs.com/en/terms-and-conditions

DA28704: Chain of Custody
Page 1 of 2

SGS Accutest Sample Receipt Summary

Job Number: DA28704 **Client:** BRAUN ENVIRONMENTAL **Project:** MM-01

Date / Time Received: 9/8/2020 2:50:00 PM **Delivery Method:** **Airbill #'s:** HD

Cooler Temps (Initial/Adjusted): #1: (5.3/5.3);

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	IR Gun;		
3. Cooler media:	Ice (Bag)		
4. No. Coolers:	1		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☑	☐
2. Trip Blank listed on COC:	☐		☑	☐
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☑		☐	☐

Comments

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

DA28704: Chain of Custody
Page 2 of 2

GC Volatiles

6

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: DA28704
Account: BRAECOL Braun Environmental, Inc.
Project: MM-01

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFK118-MB	FK1681.D	1	09/09/20	JB	n/a	n/a	GFK118

The QC reported here applies to the following samples: **Method:** RSK175 MOD

DA28704-1, DA28704-2

CAS No.	Compound	Result	RL	MDL	Units	Q
74-84-0	Ethane	ND	0.0016	0.0010	mg/l	

Blank Spike Summary

Job Number: DA28704
Account: BRAECOL Braun Environmental, Inc.
Project: MM-01

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFK118-BS	FK1680.D	10	09/09/20	JB	n/a	n/a	GFK118

The QC reported here applies to the following samples: **Method:** RSK175 MOD

DA28704-1, DA28704-2

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
74-84-0	Ethane	0.923	1.13	122	70-142

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: DA28704
Account: BRAECOL Braun Environmental, Inc.
Project: MM-01

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
DA19422-5MS	FK1683.D	10	09/09/20	JB	n/a	n/a	GFK118
DA19422-5MSD	FK1684.D	10	09/09/20	JB	n/a	n/a	GFK118
DA19422-5	FK1682.D	1	09/09/20	JB	n/a	n/a	GFK118

The QC reported here applies to the following samples: **Method:** RSK175 MOD

DA28704-1, DA28704-2

CAS No.	Compound	DA19422-5 mg/l	Q	Spike mg/l	MS mg/l	MS %	Spike mg/l	MSD mg/l	MSD %	RPD	Limits Rec/RPD
74-84-0	Ethane	ND		0.923	1.11	120	0.923	1.11	120	0	64-147/30

* = Outside of Control Limits.

GC Volatiles

Raw Data

Manual Integrations APPROVED (compounds with "m" flag)
Martin Brown 09/10/20 14:33

Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FK\2020\09.2020\090920\FK1687.D Vial: 10
Acq On : 9-9-2020 02:41:57 PM Operator: JAMILB
Sample : DA28704-1, 1X Inst : FID10
Misc : GC8813,GFK118,39,20.5,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 09 15:02:27 2020 Quant Results File: GFK53.RES

Quant Method : C:\MSDCHEM\2\METHODS\GFK53.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Tue Nov 19 10:51:10 2019
Response via : Initial Calibration
DataAcq Meth : GAS.M

Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in

	Compound	R.T.	Response	Conc	Units
	Target Compounds				
1)	Methane	0.44f	388658	0.949	rawvpm
2)	Ethene	0.00	0	N.D.	rawvp
3)	Ethane	0.00	0	N.D.	rawvp
4)	Propane	0.00	0	N.D.	rawvp
5)	n-Butane	2.59f	4216806	4.082	ppmv

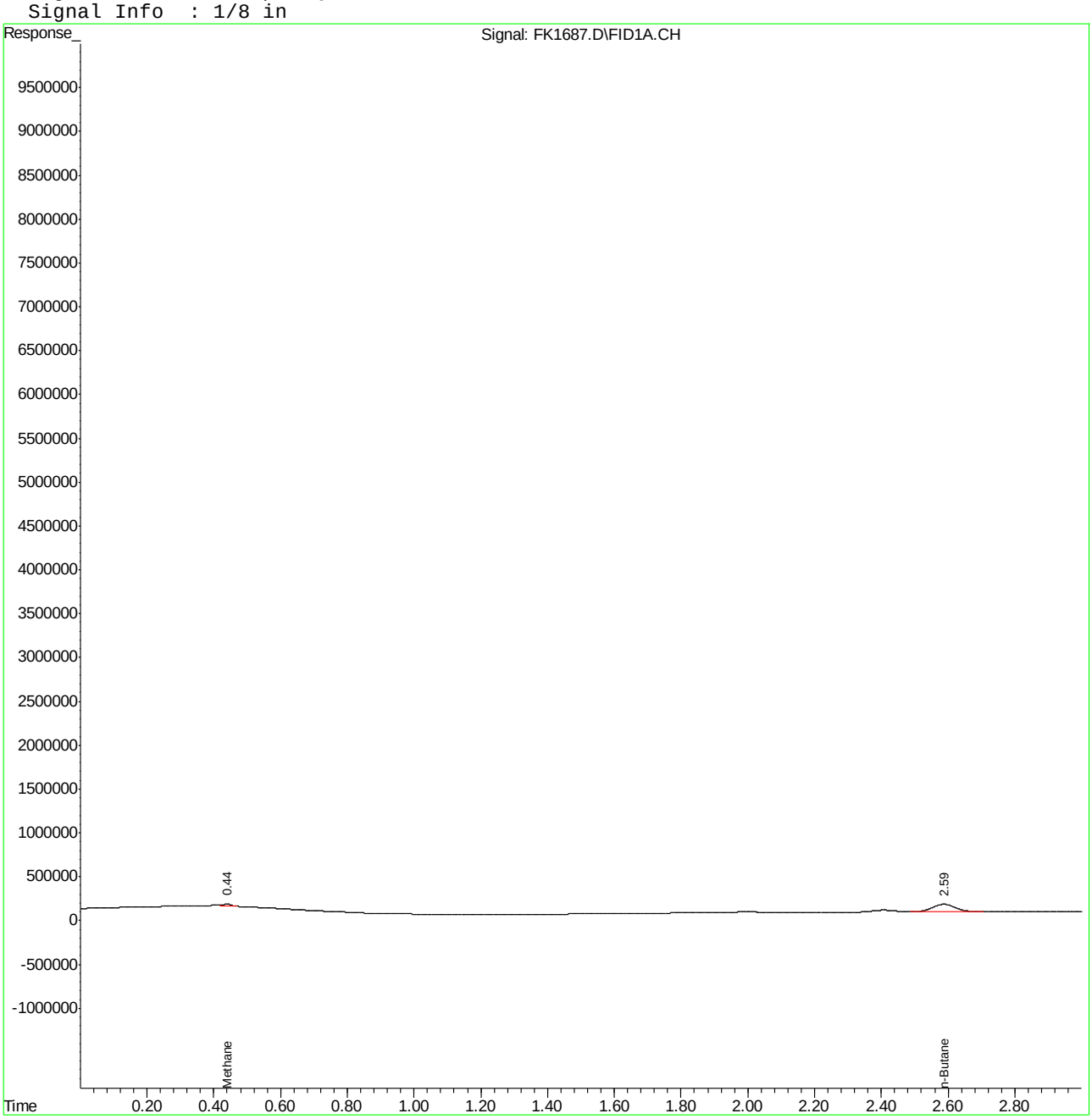
(f)=RT Delta > 1/2 Window (m)=manual int.
FK1687.D GFK53.M Wed Sep 09 15:09:33 2020 GCFA Page 1

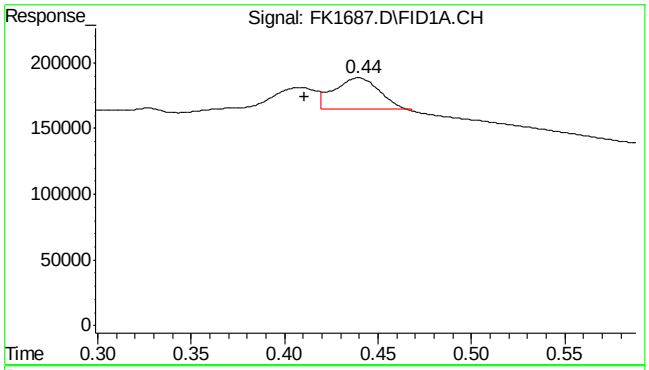
Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FK\2020\09.2020\090920\FK1687.D Vial: 10
Acq On : 9-9-2020 02:41:57 PM Operator: JAMILB
Sample : DA28704-1, 1X Inst : FID10
Misc : GC8813,GFK118,39,20.5,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 9 15:08 2020 Quant Results File: GFK53.RES

Quant Method : C:\MSDCHEM\2\METHODS\GFK53.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Tue Nov 19 10:51:10 2019
Response via : Multiple Level Calibration
DataAcq Meth : GAS.M

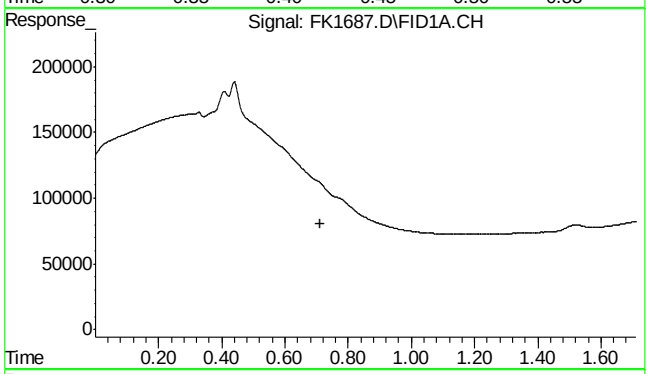
Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in





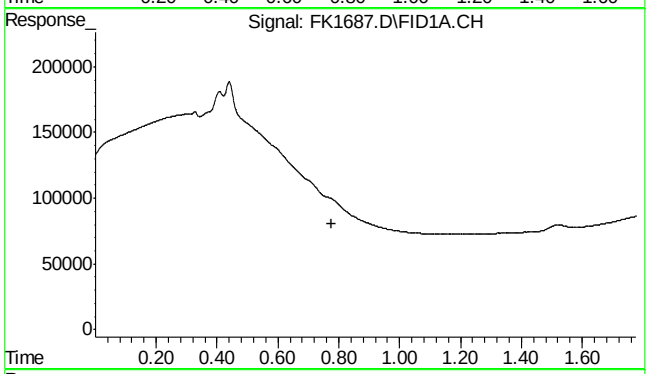
#1 Methane

R.T.: 0.440 min
Delta R.T.: 0.029 min
Response: 388658
Conc: 0.95 rawvppm m



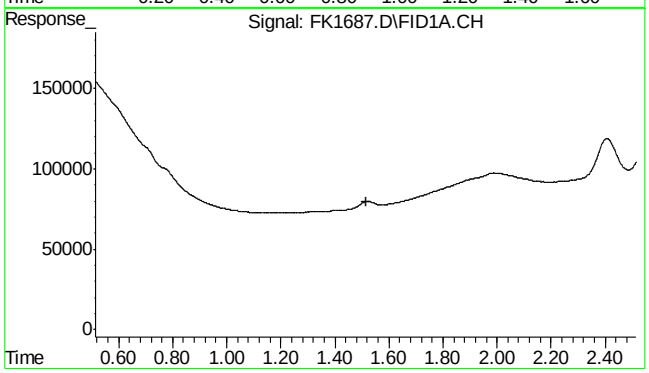
#2 Ethene

R.T.: 0.000 min
Exp R.T. : 0.711 min
Response: 0
Conc: N.D.



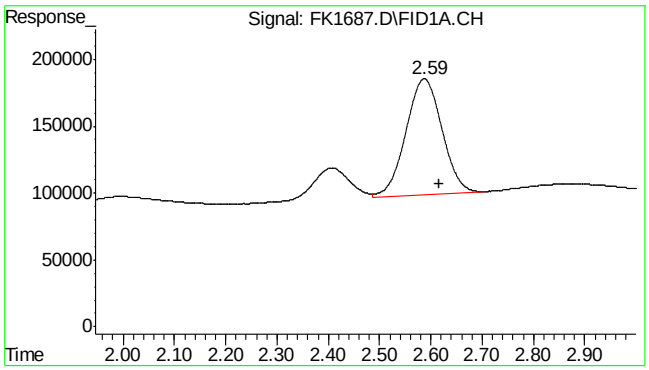
#3 Ethane

R.T.: 0.000 min
Exp R.T. : 0.777 min
Response: 0
Conc: N.D.



#4 Propane

R.T.: 0.000 min
Exp R.T. : 1.515 min
Response: 0
Conc: N.D.



#5 n-Butane

R.T.:	2.587 min
Delta R.T.:	-0.029 min
Response:	4216806
Conc:	4.08 ppmv

Dissolved Gases Raw Data Summary

Sample Number:	DA28704-1	**Sample Volume:**	39.0 ml
Lab FileID:	FK1687.D	**Headspace:**	4.0 ml
Injection Time:	09/09/20 14:41	**Volume Injected:**	500 ul
Method:	RSK175 MOD	**Temperature:**	20.5 Deg. C

Parameter	CAS	MW	Result (ppmv)	Henry's Constant	Total	Units
Methane	74-82-8	16	0.95	38340	0.0	mg/l
Ethane	74-84-0	30	0	27080	0.0	mg/l
Ethene	74-85-1	28	0	10440	0.0	mg/l
Propane	74-98-6	44	0	32552	0.0	mg/l

Henry's Constants	17	18	19	20	21	22	23	24	25	26	27
Methane	35290	36060	36830	37600	38340	39080	39820	40560	41300	42020	42740
Ethane	24020	24780	25540	26300	27080	27860	28640	29420	30200	31000	31800
Ethene	9480	9720	9960	10200	10440	10680	10920	11160	11400	11660	11920
Propane	28308	29352	30408	31474	32552	33643	34744	35857	36978	38107	39244

Manual Integrations APPROVED (compounds with "m" flag)
Martin Brown
09/10/20 14:33

Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FK\2020\09.2020\090920\FK1688.D Vial: 11
Acq On : 9-9-2020 02:50:21 PM Operator: JAMILB
Sample : DA28704-2, 1X Inst : FID10
Misc : GC8813,GFK118,39,20.5,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 09 15:02:28 2020 Quant Results File: GFK53.RES

Quant Method : C:\MSDCHEM\2\METHODS\GFK53.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Tue Nov 19 10:51:10 2019
Response via : Initial Calibration
DataAcq Meth : GAS.M

Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in

	Compound	R.T.	Response	Conc	Units
	Target Compounds				
1)	Methane	0.44f	330702	0.696	rawvpm
2)	Ethene	0.00	0	N.D.	rawvp
3)	Ethane	0.00	0	N.D.	rawvp
4)	Propane	0.00	0	N.D.	rawvp
5)	n-Butane	2.59f	13197132	14.519	ppmv

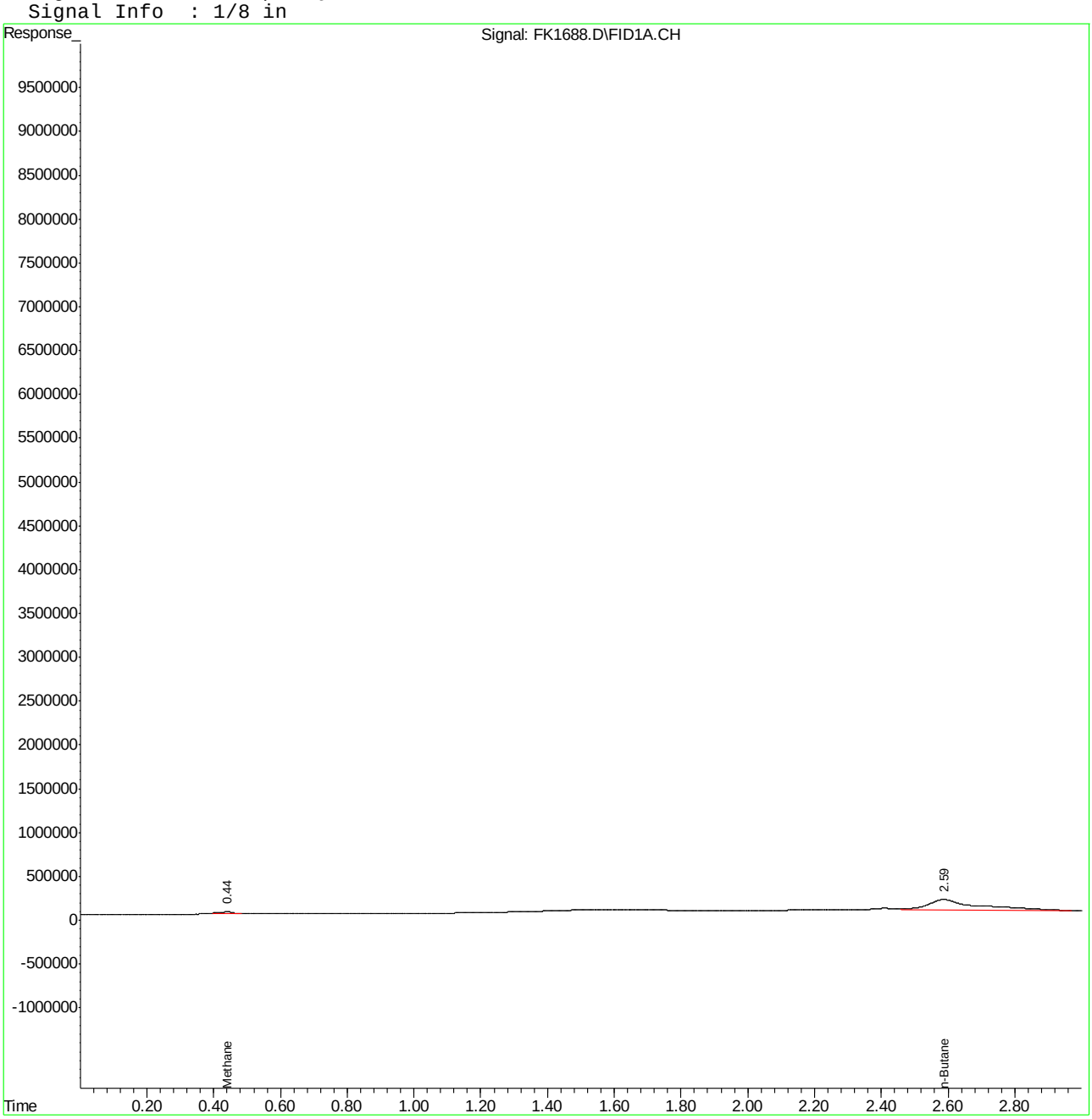
(f)=RT Delta > 1/2 Window (m)=manual int.
FK1688.D GFK53.M Wed Sep 09 15:09:34 2020 GCFA Page 1

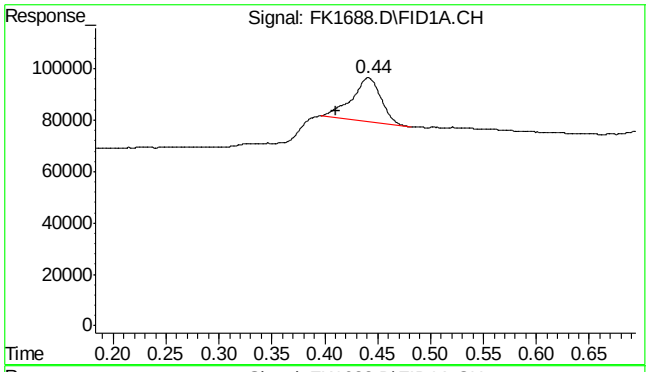
Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FK\2020\09.2020\090920\FK1688.D Vial: 11
Acq On : 9-9-2020 02:50:21 PM Operator: JAMILB
Sample : DA28704-2, 1X Inst : FID10
Misc : GC8813,GFK118,39,20.5,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 9 15:08 2020 Quant Results File: GFK53.RES

Quant Method : C:\MSDCHEM\2\METHODS\GFK53.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Tue Nov 19 10:51:10 2019
Response via : Multiple Level Calibration
DataAcq Meth : GAS.M

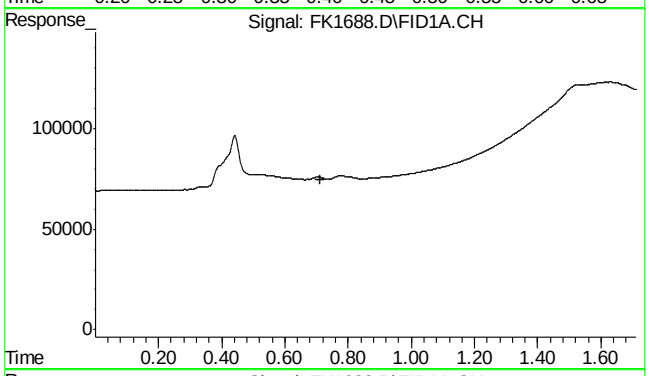
Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in





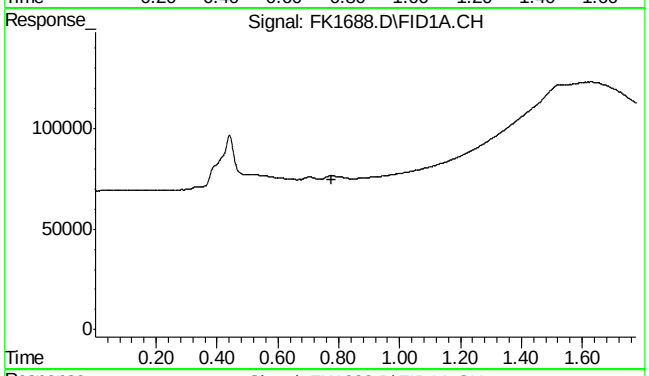
#1 Methane

R.T.:	0.442 min
Delta R.T.:	0.031 min
Response:	330702
Conc:	0.70 rawvppm m



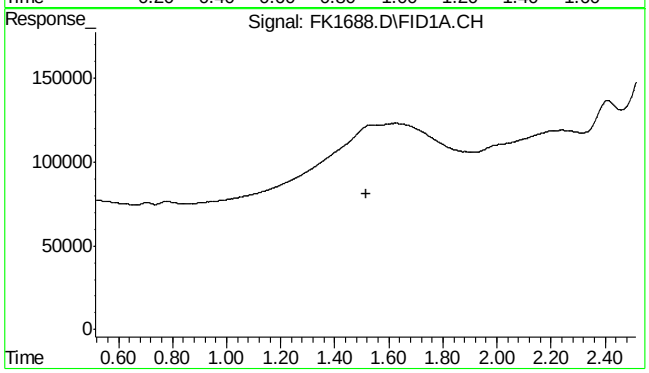
#2 Ethene

R.T.:	0.000 min
Exp R.T. :	0.711 min
Response:	0
Conc:	N.D.



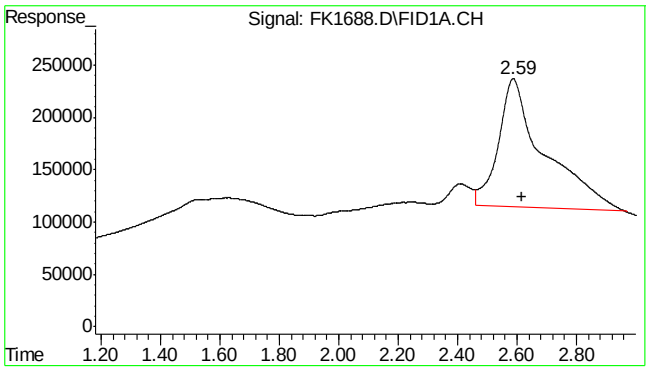
#3 Ethane

R.T.:	0.000 min
Exp R.T. :	0.777 min
Response:	0
Conc:	N.D.



#4 Propane

R.T.:	0.000 min
Exp R.T. :	1.515 min
Response:	0
Conc:	N.D.



#5 n-Butane

R.T.:	2.587 min
Delta R.T.:	-0.029 min
Response:	13197132
Conc:	14.52 ppmv

Dissolved Gases Raw Data Summary

Sample Number:	DA28704-2	**Sample Volume:**	39.0 ml
Lab FileID:	FK1688.D	**Headspace:**	4.0 ml
Injection Time:	09/09/20 14:50	**Volume Injected:**	500 ul
Method:	RSK175 MOD	**Temperature:**	20.5 Deg. C

Parameter	CAS	MW	Result (ppmv)	Henry's Constant	Total	Units
Methane	74-82-8	16	0.7	38340	0.0	mg/l
Ethane	74-84-0	30	0	27080	0.0	mg/l
Ethene	74-85-1	28	0	10440	0.0	mg/l
Propane	74-98-6	44	0	32552	0.0	mg/l

Henry's Constants	17	18	19	20	21	22	23	24	25	26	27
Methane	35290	36060	36830	37600	38340	39080	39820	40560	41300	42020	42740
Ethane	24020	24780	25540	26300	27080	27860	28640	29420	30200	31000	31800
Ethene	9480	9720	9960	10200	10440	10680	10920	11160	11400	11660	11920
Propane	28308	29352	30408	31474	32552	33643	34744	35857	36978	38107	39244

Manual Integrations APPROVED (compounds with "m" flag)
Martin Brown
09/10/20 14:33

Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FK\2020\09.2020\090920\FK1681.D Vial: 4
Acq On : 9-9-2020 01:56:13 PM Operator: JAMILB
Sample : MB Inst : FID10
Misc : GC8813,GFK118,39,20.5,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 09 15:02:21 2020 Quant Results File: GFK53.RES

Quant Method : C:\MSDCHEM\2\METHODS\GFK53.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Tue Nov 19 10:51:10 2019
Response via : Initial Calibration
DataAcq Meth : GAS.M

Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in

	Compound	R.T.	Response	Conc	Units
	Target Compounds				
1)	Methane	0.40	288847	0.512	rawvpm
2)	Ethene	0.00	0	N.D.	rawvp
3)	Ethane	0.00	0	N.D.	rawvp
4)	Propane	0.00	0	N.D.	rawvp
5)	n-Butane	0.00	0	N.D.	ppmv

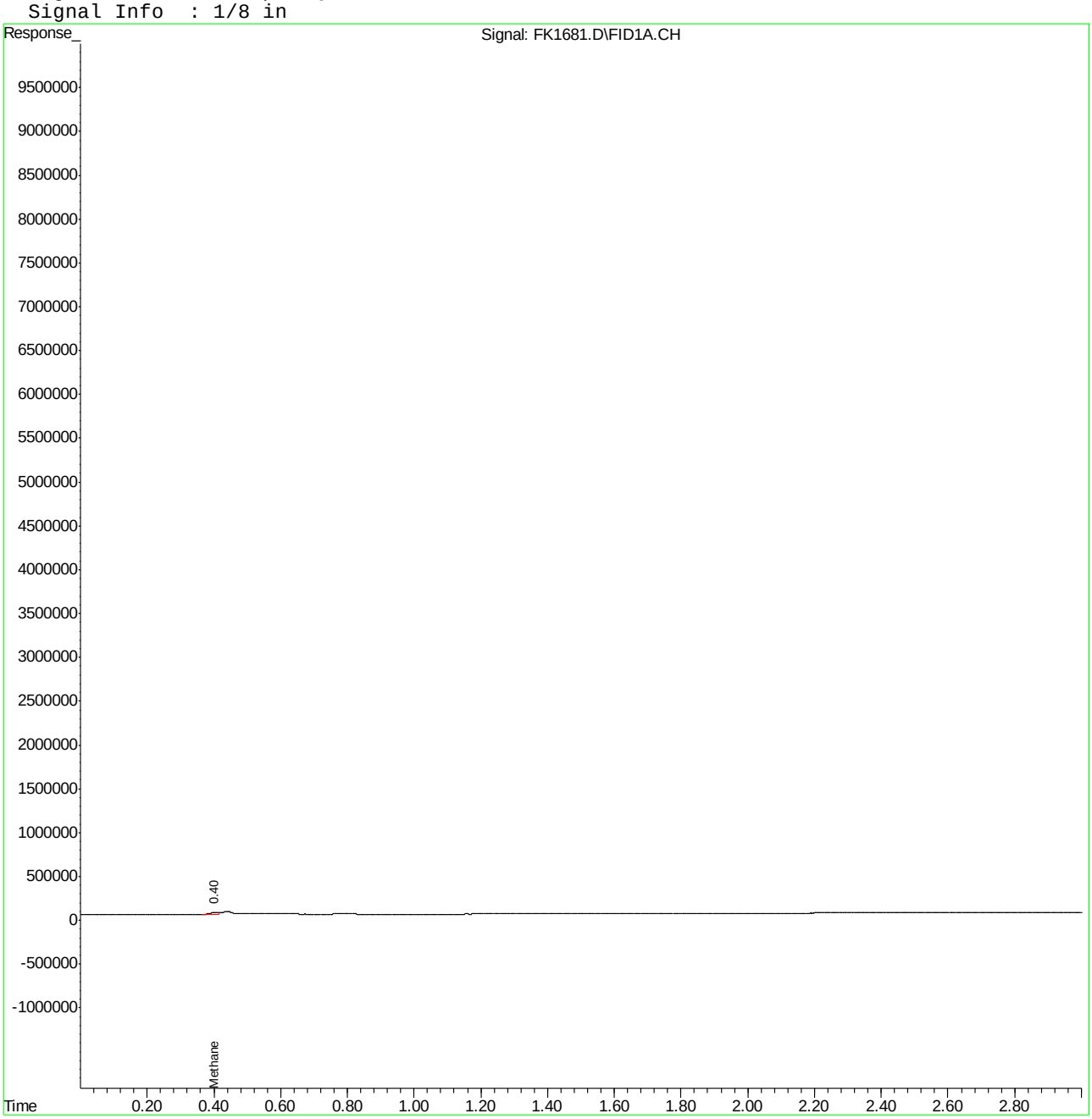
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

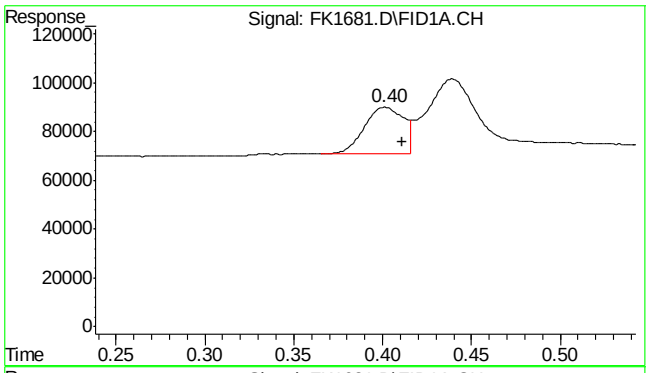
Data File : C:\SHARED\FK\2020\09.2020\090920\FK1681.D Vial: 4
Acq On : 9-9-2020 01:56:13 PM Operator: JAMILB
Sample : MB Inst : FID10
Misc : GC8813,GFK118,39,20.5,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 9 15:06 2020 Quant Results File: GFK53.RES

Quant Method : C:\MSDCHEM\2\METHODS\GFK53.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Tue Nov 19 10:51:10 2019
Response via : Multiple Level Calibration
DataAcq Meth : GAS.M

Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in

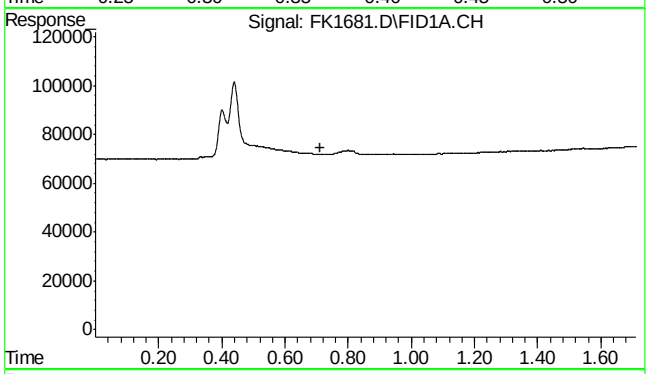


FK1681.D GFK53.M Wed Sep 09 15:09:27 2020 GCFA Page 2



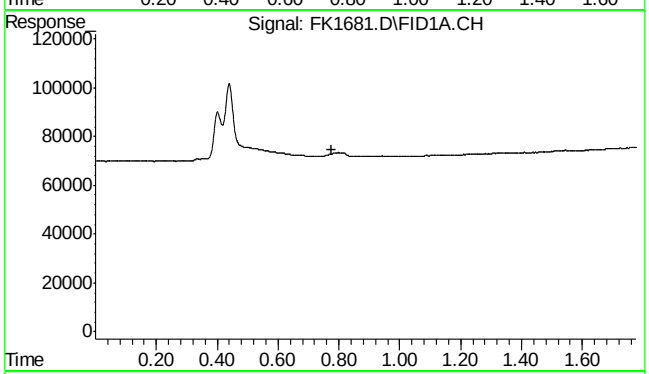
#1 Methane

R.T.:	0.401 min
Delta R.T.:	-0.010 min
Response:	288847
Conc:	0.51 rawvppm m



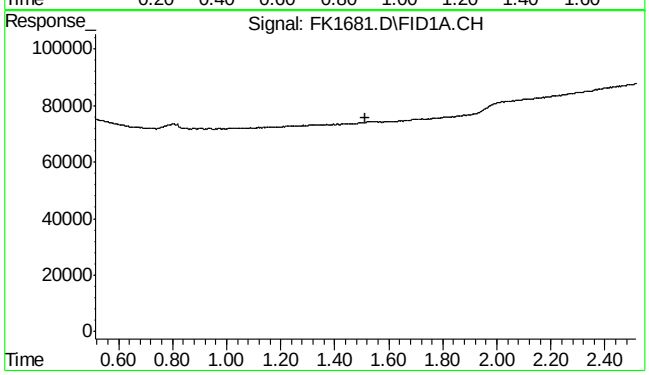
#2 Ethene

R.T.:	0.000 min
Exp R.T. :	0.711 min
Response:	0
Conc:	N.D.



#3 Ethane

R.T.:	0.000 min
Exp R.T. :	0.777 min
Response:	0
Conc:	N.D.

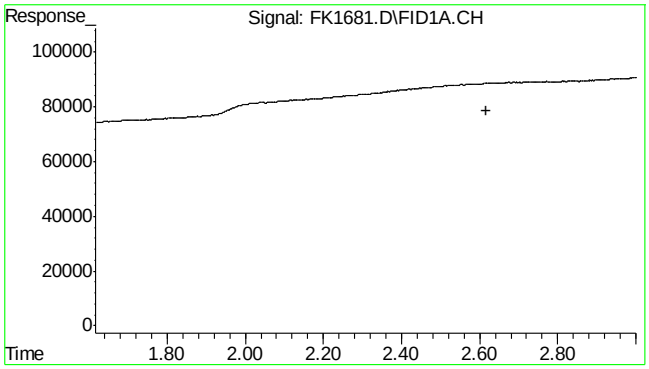


#4 Propane

R.T.:	0.000 min
Exp R.T. :	1.515 min
Response:	0
Conc:	N.D.

7.2.1

7



#5 n-Butane

R.T.:	0.000 min
Exp R.T. :	2.616 min
Response:	0
Conc:	N.D.

Dissolved Gases Raw Data Summary

Sample Number:	GFK118-MB	**Sample Volume:**	39.0 ml
Lab FileID:	FK1681.D	**Headspace:**	4.0 ml
Injection Time:	09/09/20 13:56	**Volume Injected:**	500 ul
Method:	RSK175 MOD	**Temperature:**	20.5 Deg. C

Parameter	CAS	MW	Result (ppmv)	Henry's Constant	Total	Units
Methane	74-82-8	16	0.51	38340	0.0	mg/l
Ethane	74-84-0	30	0	27080	0.0	mg/l
Ethene	74-85-1	28	0	10440	0.0	mg/l
Propane	74-98-6	44	0	32552	0.0	mg/l

Henry's Constants	17	18	19	20	21	22	23	24	25	26	27
Methane	35290	36060	36830	37600	38340	39080	39820	40560	41300	42020	42740
Ethane	24020	24780	25540	26300	27080	27860	28640	29420	30200	31000	31800
Ethene	9480	9720	9960	10200	10440	10680	10920	11160	11400	11660	11920
Propane	28308	29352	30408	31474	32552	33643	34744	35857	36978	38107	39244

braun

Braun Environmental, Inc.

ENGINEERING REPORT

ROCK TESTING FOR ACID GENERATION AND ROCK BUFFERING

MINERAL MOUNTAIN PROJECT, CRIPPLE CREEK, COLORADO

Prepared for:

LANCE BARKER

Prepared by:

C.A BRAUN, P.E, CPG

BRAUN ENVIRONMENTAL, INC.

355 TELLER STREET, SUITE 200

LAKEWOOD, COLORADO 80226

Job Number: MH-02

Date: August 6, 2014

INTRODUCTION

Braun Environmental, Inc. has been retained to do a review of the rock properties on the Mineral Mountain project, located near Cripple Creek, Colorado as they relate to potential adverse environmental conditions. The testing was specifically designed to determine if the site has potential to produce free sulfur that could lead to generation of sulfuric acid, either exhibiting itself as acid mine drainage (AMD) or as acid leaching to disturbed rock areas and adjacent soils.

BACKGROUND

In these days of high regulation, it appears that we are continually put into the position of trying to prove the negative. The reasons are many but the demand for additional reporting remains. It is well known that the Cripple Creek District is generally non-acid generating from a regulatory standpoint, but the need for reporting is necessary. Within some of the mining districts in the State of Colorado, a large amount of free sulfur was produced during the primary volcanic activity and later hydrothermal activity that occurred during the cool-down. From a chemical perspective, the sulfur produced during the volcanic activity combined chemically with whatever it could find available, with its preference being for metals and one of them being iron to form iron sulfide (pyrite). In these volcanic areas that contained abundant quantities of sulfur, the original clues to the pioneer prospectors was the presence of naturally occurring low pH surface waters.

As oxidation is currently stronger than sulfidization under Earth surface conditions, the destruction of sulfur-containing minerals from weathering and oxidation can produce free sulfur that presents itself as sulfuric acid (H_2SO_3). Certain sulfur containing minerals have a higher potential to produce sulfuric acid than others. The oxidation of iron sulfide (pyrite) produces free sulfur, while conversely in the same environment, the salts of the acid tend to bind the sulfur. A commonly occurring salt is the mineral compound calcium sulfate, commonly referred to as gypsum. In fact, calcium sulfate is currently the mineral preferred by government agencies and environmental professionals to bind sulfur, and even though the word sulfur sometimes conjures up fear, that particular sulfur-containing compound is welcomed, and even demanded by the government, as a commonly used building material in our homes.

Sulfuric acid, when allowed to mobilize, assuming buffering, will eventually become neutralized by contacting other minerals and organics that can tie up this sulfur. Once this occurs, the ions that are contained in low pH solution are forced out as a precipitate as the pH rises. A common ion found in solution in low pH water is iron. This precipitate has a characteristic red color when deposited as an oxide. These chemical reactions occur naturally in the environment and can also be created by man as a result of disturbing materials at the surface or below the water table.

The oxidation of sulfide minerals produces predictable results based on the simple chemical reactions. However, the rate of the reaction is slightly more difficult to predict without knowledge of the other minerals present and their mechanical relationships to the sulfide mineral that is to undergo oxidation. The mineral decomposition and amount of free sulfur available to become mobile can vary greatly based on the crystal habit of the mineral, and that mineral's spatial relationship with its neighboring minerals. The presence of iron sulfide in the system, increases the chances of the generation of free sulfur, over the sulfides of other metals, but certainly does not guarantee that it will be generated. In the most simple analysis, a measure of the ratio of free accessible sulfur to the whole rock volume produces a guideline for predicting the generation of sulfuric acid. This tendency to produce free sulfur is typically referred to as Acid Generation Potential (AGP).

On the other side of the equation the non-sulfur containing minerals can act to chemically collect and bind the free sulfur. This process is typically referred to as Acid Neutralization Potential (ANP). One of the best and most efficient compounds used to tie up sulfur is calcium carbonate ($CaCO_3$). Generally AGP and ANP are referred to in terms of relative weight of calcium carbonate as compared with weight of rock. The reaction results in the sulfur ion interacting with a carbonate anion, to form calcium sulfate. Calcium sulfate is stable in an oxidizing environment, and tends to produce a material that has a low permeability, tends to shed precipitation, thus it tends to protect sulfide-bearing materials that might be located below it from weathering.

TESTING OF MATERIALS

Braun incorporated both field and laboratory evidence to investigate the materials that had potential for producing free sulfur ions. However, prior to the collection of site-specific evidence, a review of the surface waters and the drainage tunnels within the Cripple Creek district found the waters to be mostly neutral in pH and treatment of those waters for pH has not been historically necessary. The reasons are due to the low levels of exposed sulfides in the district and the amount of buffering that naturally exists in the rocks. Using this as a guideline, it would be expected that any specific property located within the district would have similar characteristic to the rest of the district.

Site Inspection and Data

Braun engineers performed site inspections of the disturbed areas within the Mineral Mountain project area during June and July 2014. During the inspections, no evidence was found of rock destruction that occurred as a result of any modern leaching, nor was any significant evidence found of any negative affects to grasses and soils immediately adjacent to the disturbed areas as a result of acid generation. It is well known that in acid generating environments, the grasses in the areas around the toes of acid generating waste rock piles commonly show biological stressing. On the rock piles that were inspected on the north side of Mineral Hill, no evidence was found of any migration of low pH waters that negatively affected the adjacent flora.

During that inspection, Braun found a shaft that contained standing water to within 12 feet of the shaft collar. That shaft had been sunk into the same mineralized structure in which the lower tunnel had been driven. Braun personnel collected a water sample from that shaft and tested the collected sample for pH. That test showed the water to have a pH of 6.1. This value is a relatively neutral number, not significantly lower than values found in the local creeks. The visual inspection of the shaft found no evidence of acid water conditions. Careful inspection of the galvanized steel shaft liner with its integral steel ladder found both of them to be in good condition with no signs of significant acid water corrosion.

Acid Based Accounting

Braun personnel collected a set of samples for acid based accounting testing. These tests are specifically designed to determine the amount of sulfur contained in the samples and the buffering potential of the matrix materials. Three samples were chosen from within the Mineral Mountain property and prospect area. These three samples, along with two of Braun's standards, were submitted to ACZ Laboratories in Steamboat Springs, Colorado. The samples were collected using Braun's standard sampling procedures and transported using standard chain of custody and shipping procedures to the certified laboratory. A brief description of the samples follows:

Sample MH-1 was collected from approximately 75 feet below the ground surface, across the mineralized structure believed to be the target for mining. It is the same structure intercepted by the shaft located on the project area. The sample was wholly composed of a lithic tuff unit commonly called the Cripple Creek breccia, the main rock-forming unit in the district. The sample contained disseminated metal mineralization and veining.

Sample MH-2 was collected from lithic tuff unit locally called the Cripple Creek breccia. The sample contained no visible sulfide minerals and is representative of the local rock unit of the area.

Sample MH-3 consisted of a 1-inch wide vein collected from approximately 75 feet below the ground surface and typical of veins of the district. It contains a combined total ratio of sulfide plus telluride minerals to other minerals of about 5 percent and it is hoped that the sample will be found to contain economic grade minerals.

Sample MH-4 was a standard prepared by Braun. It is composed of Cripple Creek breccia and contains a predetermined sulfide concentration of 5 percent.

Sample MH-5 was a standard prepared by Braun. It is composed of quartz sulfide vein containing 20% pyrite, 5% galena, 5% sphalerite, 65% vein white quartz, and 5% percent calcite.

ACZ Laboratories tested each of the samples for total sulfur, pyritic sulfur, and for sulfate sulfur. Acid generation potential (AGP) was determined using EPA Method M600/2-78-54-054-3.2.4, acid neutralization potential (ANP) was determined using EPA Method M66/2-78-054 1.3, and the acid base potential (ABP) result was reached using EPA Method M66/2-78-054 1.3. The results are tabulated in Table 1 below with Laboratory reports attached as Appendix A.

Table 1
Acid Base Accounting Data for Mineral Mountain Project
Source - ACZ Laboratories, Inc.

Sample	Acid Generation Potential* (ton $CaCO_3$/kton)	Acid Generation Potential** (ton $CaCO_3$/kton)	Acid Neutralization Potential (ton $CaCO_3$/kton)	Acid Base Potential[1] (ton $CaCO_3$/kton)	Sample Description
MH-1	28	24	24	0	Structure - Sample across mineralized structure
MH-2	1.9	0.3	13	13	Country Rock- non-mineralized
MH-3	97	75	7	-68	One-inch wide vein
MH-4	124	105	15	-90	Standard - Lithic tuff with known percentage of metal sulfides (5% by vol)
MH-5	391	331	16	-315	Standard - Sulfide in Quartz Vein-25% pyrite, 5% galena, 5% sphalerite, 60% quartz, and 5% calcite (by vol)

Notes:

* Calculation using Total Sulfur

** Calculation using Pyritic Sulfur

[1] Calculated using Pyritic Sulfur

A review of Table 1 shows the results of the three samples. Column 1 contains the sample number, column 2 shows the AGP based on total sulfur, and column 3 is AGP based on pyritic sulfur. Column 4 shows the ANP of the sample, and column 5 produces the ABP value based on the pyritic sulfur. Note that while the total AGP value in column 3 is larger of the two AGP values, the number in column 2 also includes the sulfate component, which is not available to be mobile in this environment. The results show that the country rock (Sample MH-2) is acid neutralizing with an ABP of 13. Sample MH-1,

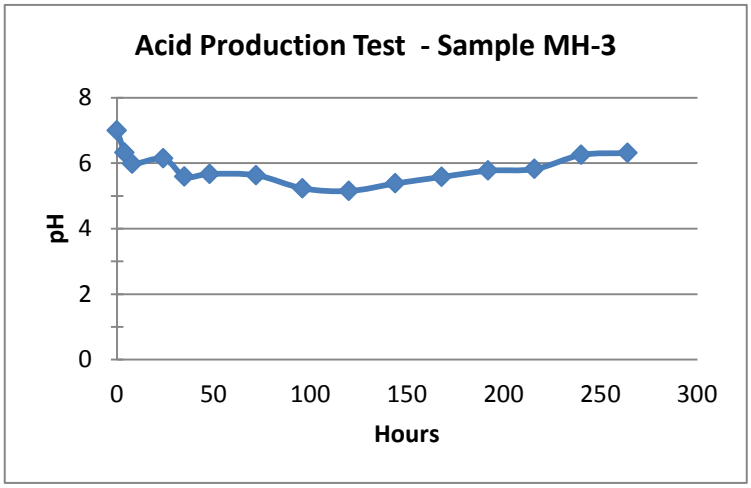
collected across the mineralized structure, shows an ABP value of zero, having neither any acid generating nor buffering value. Sample MH-3, a low percentage spot sample, was specifically chosen to represent the highest concentration of sulfur producing material found within the project area. That sample was determined to have an ABP value of -68, meaning that chemically, it has the ability to be acid generating, but represents a small fraction of the total volume of ore that might be produced. Samples MH-4 and MH-5 were Braun standards, submitted to the laboratory for quality assurance. As can be seen in the table, and by comparing the laboratory results attached in Appendix A, the laboratory results correlate well with the known percentages of minerals shown for those two samples.

Rate Testing

In order to better assess the generation of sulfur as it would relate to actual conditions that might be anticipated during actual mining, Braun ran an additional leach test. This test was designed to mimic surface storage conditions in a moist oxidizing environment, and assumed a worst case that the material would be exposed to rain and standing water.

Table 2
Acid Leach Exposure Results
Mineral Mountain Sample MH-3
Source - Braun Environmental, Inc.

Hour	pH
0	6.99
4	6.32
8	5.98
24	6.14
35	5.59
48	5.67
72	5.63
96	5.23
120	5.15
144	5.38
168	5.58
192	5.77
216	5.82
240	6.25
264	6.31



This test is slightly less rigorous than the test used for landfills that uses glacial acidic acid as the working fluid. However, that test is designed for material that is to be buried and the test Braun performed is better suited for material that might have surface exposure. The test was run on a one kilogram sample split of Sample MH-3 with the sample placed in a water bath having a starting pH of 6.95. The test sample was agitated once per day for 11 days, and the liquor generated from the material was tested daily using a pH meter. The results of the test are shown below in Table 2. As can be seen, the initial pH started at 6.95 and rapidly decreased to the mid-5 range where it reached a low of 5.15 on day five. From that point, the pH began to slowly increase again reaching 6.31 on the eleventh day of the test. The data suggests a second order curve asymptotically approaching a pH of 6.36. The test results showed a slightly higher pH than the meteoric waters which were exposed to the walls of the shaft. It is noteworthy that this test was performed on a sample that represents the maximum percentage of sulfide to rock mass found during the investigation, and that this material could not be easily segregated by normal mining methods to allow its exposure to the environment anyway.

DISCUSSION AND CONCLUSIONS

Braun has performed a site inspection and has tested materials from the Mineral Mountain project area. It can be globally stated that the rocks making up the Cripple Creek district data are non-acid generating. This statement is also applicable for the Mineral Hill area as evidenced by the absence of low pH waters, both surface and subsurface, and the lack of low pH distressed vegetation in areas adjacent to old mine dumps.

Representative rock samples were collected on the Mineral Mountain site by Braun personnel, and tested using standard acid based accounting procedures by ACZ Laboratories of Steamboat Springs, Colorado. ACZ reported that the materials tested ranged from having the potential to generate acid to having a significant buffering potential. Sample MH-2 exhibited the best buffering capability, while Sample MH-3 showed the best acid generating potential (not including standards). While Sample MH-3 appears to have the potential to be an acid generator, a review of the description of that sample shows it being composed of a one-inch wide vein. This narrow of feature could not be physical mined using

currently available mining techniques, and in practice would be diluted by the adjacent rock; rock that was found by the testing to be non-acid generating. Thus, Sample MH-1, collected from the mineralized structure, best represents the materials that might be produced as ore, and review of Table 1 shows that sample to be neutral or non-acid generating. From the ACZ testing, it can be concluded that the materials that might be reasonably produced from this site will be non-acid generating.

One other characteristic on which testing was performed was the rate of acid generation, which is dependent on the rate of decomposition of the sulfide minerals. Testing was performed to create conditions similar to those anticipated to occur if the material were moved to the surface. This test was run on Sample MH-3 to produce a worst-case scenario, even though realistically that material could not be physically segregated away from the material represented by Sample MH-12. The testing revealed that sample's rate of sulfide decomposition was quite slow, as evidenced by the absence of any low pH values produced by the 11-day test. Thus, the conclusion is reached that even if sulfide minerals are present at the Mineral Mountain project site, they do not appear to rapidly break down in the typical surface environment, and sufficient buffering is available in the country rock to maintain a near-neutral to basic overall pH.

Braun Environmental has performed an investigation of the Mineral Mountain project area, and based on those results of the field investigation and from the laboratory testing, it is Braun's professional opinion that the materials sampled are aggregately non-acid generating, as viewed from a regulatory standpoint. Based on this information, and current governmental standards, no threat to human health or the environment exists with respect to acid generation, and no further studies are recommended. However, per good mining practice, it is suggested that future produced materials be periodically reviewed by the operator, and if the potential for acid production is suspected, that testing be performed.

APPENDIX A

ACZ LABORATORY TEST REPORT

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

July 28, 2014

Report to:
Art Braun
Braun Environmental, Inc.
355 S Teller St.
Suite 200
Lakewood, CO 80226

Bill to:
Art Braun
Braun Environmental, Inc.
355 S Teller St.
Suite 200
Lakewood, CO 80226

Project ID: MH-01
ACZ Project ID: L19264

Art Braun:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on July 07, 2014. This project has been assigned to ACZ's project number, L19264. 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 L19264. 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 August 27, 2014. 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.

Max Janicek has reviewed and approved this report.

Braun Environmental, Inc.
Project ID: MH-01
Sample ID: 060514-1

ACZ Sample ID: ***L19264-01***
Date Sampled: *07/03/14 08:05*
Date Received: *07/07/14*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		28			t CaCO3/Kt	0.3	3	07/28/14 10:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		24			t CaCO3/Kt	1	5	07/28/14 10:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-4			t CaCO3/Kt			07/28/14 10:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	2.4		*	%	0.1	0.5	07/25/14 14:03	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.76		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.76		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Sulfate		1	0.13		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Total		1	0.89		*	%	0.01	0.1	07/21/14 0:00	cra
Total Sulfur minus Sulfate		1	0.76		*	%	0.01	0.1	07/21/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								07/09/14 10:45	spl
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								07/21/14 11:00	pgw

Braun Environmental, Inc.
Project ID: MH-01
Sample ID: 060514-2

ACZ Sample ID: ***L19264-02***
Date Sampled: *07/03/14 08:25*
Date Received: *07/07/14*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		1.9	B		t CaCO3/Kt	0.3	3	07/28/14 10:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		13			t CaCO3/Kt	1	5	07/28/14 10:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		11			t CaCO3/Kt			07/28/14 10:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	1.3		*	%	0.1	0.5	07/25/14 15:19	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	0.01	B	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Pyritic Sulfide		1	0.01	B	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Sulfate		1	0.05	B	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Total		1	0.06	B	*	%	0.01	0.1	07/21/14 0:00	cra
Total Sulfur minus Sulfate		1	0.01	B	*	%	0.01	0.1	07/21/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								07/09/14 17:18	spl
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								07/21/14 11:15	pgw

Braun Environmental, Inc.
Project ID: MH-01
Sample ID: 060514-3

ACZ Sample ID: ***L19264-03***
Date Sampled: *07/03/14 08:33*
Date Received: *07/07/14*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		97			t CaCO3/Kt	0.3	3	07/28/14 10:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		7			t CaCO3/Kt	1	5	07/28/14 10:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-90			t CaCO3/Kt			07/28/14 10:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	0.7		*	%	0.1	0.5	07/25/14 16:35	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	2.40		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Pyritic Sulfide		1	2.40		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Sulfate		1	0.70		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Total		1	3.10		*	%	0.01	0.1	07/21/14 0:00	cra
Total Sulfur minus Sulfate		1	2.40		*	%	0.01	0.1	07/21/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								07/09/14 23:52	spl
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								07/21/14 11:30	pgw

Braun Environmental, Inc.
Project ID: MH-01
Sample ID: 060514-4

ACZ Sample ID: ***L19264-04***
Date Sampled: *07/03/14 08:47*
Date Received: *07/07/14*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		124			t CaCO3/Kt	0.3	3	07/28/14 10:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		15			t CaCO3/Kt	1	5	07/28/14 10:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-109			t CaCO3/Kt			07/28/14 10:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	1.5		*	%	0.1	0.5	07/25/14 17:13	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	3.37		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Pyritic Sulfide		1	3.37		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Sulfate		1	0.61		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Total		1	3.98		*	%	0.01	0.1	07/21/14 0:00	cra
Total Sulfur minus Sulfate		1	3.37		*	%	0.01	0.1	07/21/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								07/10/14 6:26	spl
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								07/21/14 11:45	pgw

Braun Environmental, Inc.
Project ID: MH-01
Sample ID: 060514-5

ACZ Sample ID: ***L19264-05***
Date Sampled: *07/03/14 08:58*
Date Received: *07/07/14*
Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4		391			t CaCO3/Kt	0.3	3	07/28/14 10:00	calc
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		16			t CaCO3/Kt	1	5	07/28/14 10:00	calc
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3		-375			t CaCO3/Kt			07/28/14 10:00	calc
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1	1.6		*	%	0.1	0.5	07/25/14 17:52	spl
Sulfur Forms	M600/2-78-054 3.2.4-MOD									
Sulfur HCl Residue		1	10.60		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur HNO3 Residue		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Organic Residual		1		U	*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Pyritic Sulfide		1	10.60		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Sulfate		1	1.85		*	%	0.01	0.1	07/21/14 0:00	cra
Sulfur Total		1	12.50		*	%	0.01	0.1	07/21/14 0:00	cra
Total Sulfur minus Sulfate		1	10.60		*	%	0.01	0.1	07/21/14 0:00	cra

Soil Preparation

Parameter	EPA Method	Dilution	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972								07/10/14 13:00	spl
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3								07/21/14 12:00	pgw

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Recovered amount of the true value or spike added, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calibration Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	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

Braun Environmental, Inc.

ACZ Project ID: ***L19264***

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG368303													
WG368303PBS	PBS	07/25/14 12:47				U	%		-0.1	0.1			
WG368303LCSS	LCSS	07/25/14 13:25	PCN45596	4.96		5	%	100.8					
L19264-01DUP	DUP	07/25/14 14:41			2.4	2.38	%				0.8	20	
L19264-02MS	MS	07/25/14 15:57	SI140528-1	1	1.3	2.2	%	90	70	130			

Sulfur Organic Residual M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG367982													
L19264-01DUP	DUP	07/21/14 15:30			U	U	%				0	20	RA

Sulfur Pyritic Sulfide M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG367982													
L19264-01DUP	DUP	07/21/14 15:30			.76	.72	%				5.4	20	

Sulfur Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG367982													
L19264-01DUP	DUP	07/21/14 15:30			.13	.14	%				7.4	20	

Sulfur Total M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG367982													
WG367982PBS	PBS	07/21/14 15:30				U	%		-0.03	0.03			
WG367982LCSS	LCSS	07/21/14 15:30	PCN45913	4.07		3.72	%	91.4	80	120			
L19264-01MS	MS	07/21/14 15:30	PCN45349	1.1	.89	1.81	%	83.6	80	120			
L19264-01DUP	DUP	07/21/14 15:30			.89	.86	%				3.4	20	

Total Sulfur Minus Sulfate M600/2-78-054 3.2.4-MOD

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG367982													
L19264-01DUP	DUP	07/21/14 15:30			.76	.72	%				5.4	20	

Inorganic Extended Qualifier Report

Braun Environmental, Inc.

ACZ Project ID: ***L19264***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L19264-01	WG367982	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L19264-02	WG367982	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L19264-03	WG367982	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L19264-04	WG367982	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L19264-05	WG367982	Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Braun Environmental, Inc. ACZ Project ID: ***L19264***

Soil Analysis

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

Neutralization Potential as CaCO3	M600/2-78-054 3.2.3
Sulfur HCl Residue	M600/2-78-054 3.2.4-MOD
Sulfur HNO3 Residue	M600/2-78-054 3.2.4-MOD
Sulfur Organic Residual	M600/2-78-054 3.2.4-MOD
Sulfur Pyritic Sulfide	M600/2-78-054 3.2.4-MOD
Sulfur Sulfate	M600/2-78-054 3.2.4-MOD
Sulfur Total	M600/2-78-054 3.2.4-MOD
Total Sulfur minus Sulfate	M600/2-78-054 3.2.4-MOD

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Braun Environmental, Inc.
MH-01

ACZ Project ID: L19264
Date Received: 07/07/2014 12:28
Received By: ear
Date Printed: 7/7/2014

Receipt Verification

	YES	NO	NA
1) Is a foreign soil permit included for applicable samples?			X
2) Is the Chain of Custody 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 complete and accurate?	X		
7) Were any changes made to the Chain of Custody 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 match for Sample ID, Date, and Time?	X		
11) For preserved bottle types, was the pH checked and within limits?			X
12) Is there sufficient sample volume to perform all requested work?	X		
13) Is the custody seal intact on all containers?			X
14) Are samples that require zero headspace acceptable?			X
15) Are all sample containers appropriate for analytical requirements?	X		
16) Is there an Hg-1631 trip blank present?			X
17) Is there a VOA trip blank present?			X
18) Were all samples received within hold time?	X		

Chain of Custody Related Remarks

Client Contact Remarks

Shipping Containers

Cooler Id	Temp (°C)	Rad (µR/Hr)	Custody Seal Intact?
NA19971	22.7	12	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.

L19264

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Report to:

Name: Art Braun	Address: 355 S. Teller St., Suite 200
Company: Braun Environmental, Inc.	Lakewood, Colorado 80226
E-mail: braunenv@msn.com	Telephone: 303-988-7697

Copy of Report to:

Name: NA	E-mail: NA
Company: NA	Telephone: NA

Invoice to:

Name: Art Braun	Address: As above
Company: Braun Environmental, Inc.	
E-mail: braunenv@msn.com	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: A. Braun Sampler's Site Information State CO Zip code 80813 Time Zone M

*Sampler's Signature: A Braun

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

PROJECT INFORMATION

Quote #: CC-ABA - Analysis per Quote

PO#: MH-01

Reporting state for compliance testing: NA

Check box if samples include NRC licensed material? ☐

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers								
060514-1	7/3/14:8:05am	SO	1	☐	☐	☐	☐	☐	☐	☐	☐
060514-2	7/3/14:8:25am	SO	1	☐	☐	☐	☐	☐	☐	☐	☐
060514-3	7/3/14:8:33am	SO	1	☐	☐	☐	☐	☐	☐	☐	☐
060514-4	7/3/14:8:47am	SO	1	☐	☐	☐	☐	☐	☐	☐	☐
060514-5	7/3/14:8:58am	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
	7/3/14 11:12A	Post Office	
			7-7-14 1120

FRMAD050.03.14.13 White - Return with sample. Yellow - Retain for your records.

L19264 Chain of Custody

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

7/2/2014

5 Samples dlf

Quote Number: CC-ABA

Matrix: Soil Cripple Creek ABA: 6 Samples

Parameter	Method	Detection Limit	Cost/Sample
Misc.			
Electronic Data Deliverable			$0.00
Quality Control Summary			$0.00
Sample Preparation			
Air Dry at 34 Degrees C	USDA No. 1, 1972		$8.00
Crush and Pulverize (Ring & Puck)	EPA-600/2-78-054 3.1.3		$14.00
Soil Analysis			
Acid Generation Potential (calc on Sulfur total)	M600/2-78-054 3.2.4	Calculation	$0.00
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	Calculation	$0.00
Acid-Base Potential (calc on Sulfur total)	M600/2-78-054 1.3	Calculation	$0.00
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.1 %	$16.00
Sulfur Forms	M600/2-78-054 3.2.4-MOD	0.01 %	$74.00
		Cost/Sample:	**$112.00**

Pricing is based on standard 3 WEEK TAT and standard reports.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Quote

Quote Number: CC-ABA

CONTRACT DETAILS

Pricing includes shipment of all standard sample containers and related paperwork by UPS Ground Service. Please allow three to five days for delivery when ordering containers. ACZ must be notified prior to receiving samples of all special requests such as electronic data deliverables or special reporting reqirements. The client will be charged for special sample containers or express shipping and additional charges may apply for non-standard requests.

This quotation is valid for six months from the bid date unless specified otherwise in the bid. All bids must be signed and returned to ACZ before the project(s) is received. The authorized signature represents acceptance of the pricing as well as the general terms and conditions of ACZ Laboratories, Inc. which may be downloaded from our web site at http://www.acz.com/PDF/termsconditions.pdf. Please note that MDL's in this quote may possibly increase due to sample matrix or samples with high TDS.

All orders that require shipping of coolers are subject to a minimum charge of $200.00. Local orders without shipping are subject to a minimum charge of $125.00. Samples may incur a $11.00/sample disposal fee for any samples deemed to be hazardous.

ACZ Representative (Authorized signature and date) _____

Client Representative (Authorized signature and date) _____