GEI Consultants

Consulting
Engineers and
Scientists

2 December 2022

Alan J. Leak
RESPEC
720 S. Colorado Blvd., Suite 410S
Denver, Colorado 80246

Email: Alan.Leak@RESPEC.com

Re: Scope to perform microbial source tracking analyses

Dear Mr. Leak,

Per our discussion, GEI Consultants, Inc. is providing the Chatfield Watershed Authority (CWA) this scope of work to perform microbial source tracking (MST) analyses on surface water collected from Sellars Gulch and potentially East Plum Creek during the 2023 summer. We understand that over the past two summers, CWA and Colorado School of Mines (CSM) documented very high *Escherichia coli* counts in Sellars Gulch, just upstream of East Plum Creek, indicating fecal contamination in the basin. In response, the CWA Technical Advisory Committee (TAC) is seeking additional field studies to help characterize the source of fecal coliforms in Sellars Gulch. GEI will perform the collection of these samples with the goal to characterize the source of the elevated *E. coli* conditions in the basin.

Microbial source tracking methods are molecular based and detect specific target DNA markers in environmental samples to identify sources of fecal contamination. The methodology uses quantitative polymerase chain reaction (qPCR) to extract and amplify total DNA from the sample, then quantifies specific genetic markers to identify sources (e.g., human, dogs, cow, sheep, deer, Canada goose) associated with fecal pollution in the sample. The microbial source tracking analyses are setup on an *ala carte* basis, depending on the potential sources in the watershed and the desire to identify specific markers. The primary qPCR analysis will target genetic markers for humans, and we have selected two secondary analyses to target cow-sheep-deer and Canada goose. Depending on land use within Sellars Gulch, the secondary analyses can be exchanged or added to, to include genetic markers for dogs, if desired. A secondary qPCR analysis can also determine the concentration of *E. coli* in cells per milliliter (cells/mL), but these results are different from the most probable number per mL (MPN/mL) used for regulatory assessment. Therefore, we recommend performing a separate *E. coli* test (e.g., Colilert®) to be consistent with past sampling events.

GEI will perform one microbial sampling event and collect up to four samples (i.e., four locations), dependent on further discussion with CWA TAC. The location of samples would be consistent with locations sampled by CSM. Timing of sampling should also be

consistent with peak coliform counts observed by CSM and consider other factors such as baseflow or stormflow conditions.

Environmental conditions will be documented, and photographs will be taken to record site conditions. Water samples will be labeled appropriately, logged into a Chain of Custody form, and shipped overnight to Microbial Insights for analysis. The laboratory will provide sample bottles and clean field sampling techniques will be followed. GEI will perform the *E. coli* analysis (Colilert®) and summarize the field sampling event and laboratory results in a data memorandum.

The estimated cost to implement the microbial source tracking event is $4,920. The cost breakdown is provided in Table 1 and includes labor, equipment, and laboratory/shipping costs. An option for analyzing two additional samples is $1,210, which is based on the laboratory costs for three genetic markers per MST test along with *E. coli* analysis. The cost for the primary MST marker and DNA extraction is $330, and secondary markers are $90 per marker. Laboratory costs will be adjusted accordingly based on the analyses. Work will be performed on a time-and-expense basis in accordance with the 2022 Fee Schedule and Payment Terms.

Table 1: Estimated cost to collect MST samples at Sellars Gulch.

Task	Labor ($)	Equipment ($)	Laboratory ($)	Total ($)
1. Field Sampling (2 Samples)	1,700	220	1,500	3,420
2. Data Memo	1,500			1,500
3. Optional (2 Additional Samples)			1,210	1,210
Estimated Cost (2 Samples)				4,920

Please contact Craig if you have any questions regarding the proposed scope of services.

Respectfully submitted,

Craig Wolf
Senior Aquatic Ecologist / Limnologist
303.264.1028

Lee Bergstedt
Vice President, Branch Manager

Attachment: 2022 Life Sciences Fee Schedule

FEE SCHEDULE

Personnel Category	Hourly Billing Rate $ per hour
Staff Professional – Grade 1	$ 102
Staff Professional – Grade 2	$ 116
Project Professional – Grade 3	$ 122
Project Professional – Grade 4	$ 139
Senior Professional – Grade 5	$ 165
Senior Professional – Grade 6	$ 200
Senior Professional – Grade 7	$ 245
Senior Consultant – Grade 8	$ 270
Senior Consultant – Grade 9	$ 312
Senior Principal – Grade 10	$ 312
Technician 4	$ 110
Technician 3	$ 96
Technician 2	$ 89
Technician 1	$ 84
Word Processor, Administrative Staff	$ 89

These rates are billed for both regular and overtime hours in all categories.

OTHER PROJECT COSTS

Third Party Project Charges – All third party project charges will be billed at cost plus a 5% service charge. Examples of such charges include chemical laboratory charges; rented or leased equipment; printing and communication costs; shipping and mailing costs; sample disposal costs; transportation costs, project permits, and licenses.

Field Equipment Charges – GEI-owned field equipment will be billed at the following rates:

Backpack and shoreline electro-fishers	$ 201/day	Invertebrate equipment package	$ 69/day
Boat electro-fisher	$ 518/day	Flow meter	$ 104/day
Boat only	$ 324/day	Multi-probe	$ 196/day
IFIM equipment package	$ 104/day		

Transportation Charges - Automobile expenses for GEI or employee owned cars will be charged at the rate per mile set by the Internal Revenue Service for tax purposes plus tolls and parking charges or at a rate negotiated for each project. When required for a project, four-wheel drive vehicles owned by GEI or the employees will be billed at a daily rate appropriate for those vehicles. Travel costs including airfare, rental vehicles, taxis, parking, tolls, and other transportation charges will be billed at cost plus 5% service charge.

PAYMENT TERMS

Invoices will be submitted monthly or upon completion of a specified scope of service, as described in the accompanying contract (proposal, project, or agreement document that is signed and dated by GEI and CLIENT). Payment is due upon receipt of the invoice. Interest will accrue at the rate of 1% of the invoice amount per month, for amounts that remain unpaid more than 30 days after the invoice date. All payments will be made by either check or electronic transfer to the address specified by GEI and will include reference to GEI's invoice number.