Groundwater Quality Monitoring Plan

Fort Lupton Sand and Gravel Mine

LGE – Fort Lupton

12546 Weld County Road 18

Fort Lupton, CO

June 9, 2025

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1.0 INTRODUCTION

LG Everist, Inc is planning to mine aggregate resources from northern portions of the Fort Lupton mine site, Permit M-1999-120. An amended mining permit for the Fort Lupton mine site incorporates the northern portions into the mining site. The amendment area is approximately 202.25 acres and is located northeast and northwest of the current Fort Lupton mine site.

The purpose of this Groundwater Quality Monitoring Plan (GWMP) is to provide a description and assessment of the potential of the introduction of pollutants into the groundwater during mining activities, and to assess if and how water quality may change over time. The plan also provides information about the collection of water level measurements to show water level changes over time.

Sample collection is described in a separate Groundwater Sampling Plan (GSP). The groundwater sampling procedures, sample handling, and laboratory methods are presented in the GSP.

This GWMP will designate what data is collected and how it may be interpreted and modified as the mining activities progress. Both the GWMP and the Groundwater Sampling Plan (GSP) will be followed for all groundwater monitoring done at the LG Everist – Fort Lupton North (LGE-FLN) site.

The Colorado Division of Reclamation, Mining and Safety (DRMS) requires a GWMP for the LG Everist – Fort Lupton (LGE-FL) mining permit to establish baseline constituent concentrations for comparison to future sample results to assess whether mining activities are impacting groundwater quality. Water quality monitoring wells (WQM), approved by DRMS, will be sampled for five quarters to establish a baseline set of data. Future samples may be collected from the water quality monitoring wells (WQM) and compared to the baseline data during mining activities.

2.0 MONITORING PLAN COMPONENTS

The network of groundwater monitoring wells is shown in Figure 1 – Monitoring Wells. The entire well monitoring network includes the water quality monitoring wells and the other water gauging wells. All of the wells are completed in the uppermost aquifer and located in up-gradient and down-gradient positions in the alluvium. Additional monitoring wells may be included in the future as necessary, or in response to regulatory concerns.

Baseline sample data is collected from the WQM wells. The baseline sample data from each of the WQM will be compared to future sample results. The comparison of the baseline data and additional WQM sample results is used to assess potential changes in water chemistry that may cause overall changes in water quality downstream.

2.1 Groundwater Flow Direction

The groundwater flow direction generally follows the topographic gradient. Groundwater generally flows from south to north, in the general flow direction of the South Platte River alluvium.

2.2 Existing Groundwater Wells

Existing groundwater wells have been used to measure water levels over the past several years. The groundwater well locations are presented in the L.G. Everist, Inc. Fort Lupton Sand and Gravel - Figure 1 Monitoring Wells, The majority of the monitoring wells are water gauging, used for water level measurements, and are also shown in Figure 1. Water quality groundwater monitoring wells are generally located at the perimeters of the site and in areas that will not be mined in the near future. The water quality monitoring wells (WQMs) are the only wells used to obtain baseline groundwater quality data for the LGE-FL site.

Groundwater wells are completed with a 2-inch diameter PVC casing and screen. The wells are constructed with screening across the entire water bearing zone, and solid piping to the surface completion. A washed sand pack is placed from the base of the well to one-foot above the screened interval. A lockable metal well cover surrounds the PVC well casing and is imbedded in a concrete pad installed at the ground surface.

Table 1: Existing Water Level Wells

WELL NAME	GRADIENT	Type
MW 6	MIDDLE	Water Level
MW 8	MIDDLE	Water Level
MW 9	MIDDLE	Water Level
MW 11	MIDDLE	Water Level
MW 14	MIDDLE	Water Level
MW 20	MIDDLE	Water Level
MW 24	MIDDLE	Water Level
MW 25	MIDDLE	Water Level
MW 26	MIDDLE	Water Level
MW 27	MIDDLE	Water Level
MW 28	MIDDLE	Water Level
MW 29	MIDDLE	Water Level
MW 30	MIDDLE	Water Level
MW 31	MIDDLE	Water Level
MW 32	MIDDLE	Water Level
MW 34	MIDDLE	Water Level
MW 37	MIDDLE	Water Level
MW 45A	MIDDLE	Water Level
MW 52	MIDDLE	Water Level
MW 54	MIDDLE	Water Level
MW 55	MIDDLE	Water Level
MW 57	MIDDLE	Water Level
MW 58	MIDDLE	Water Level
MW 61	MIDDLE	Water Level

2.3 Water Quality Monitoring Wells

Four groundwater monitoring wells are used for water quality sampling. The groundwater monitoring wells, MW-02n, MW-03n, and MW-04n are installed as downgradient water quality sampling points. The downgradient water monitoring well MW-01n is both a water quality well and a point of compliance (POC) well.

Table 2: Existing Water Quality Well Locations and Elevations

MONITOR WELL NO./NAME	MW-01n (WQM/POC)	MW-02n (WQM)	MW-03n (WQM)	MW-04n (WQM)
NORTHING, FT	1289834.266	1289818.983	1288524.49	1286086.145
EASTING, FT	3190113.783	3187409.454	3184778.435	3185152.696
ELEVATION (TOG), FT Original Coord System	4861.275	4860.73	4884.104	4869.923
CASING HEIGHT, FT	3.42	2.83	3.25	3.58

3.0 Groundwater Monitoring

Water level gauging, measurements to the water level across the mining area, have been done since mining began. The water level measurements will continue to be made during the mining activities at the mine site and into the future as required by the mining permit.

Water quality monitoring begins at the new portions of the mine site are added to the mining permit through the amendment process. Water quality monitoring is a DRMS requirement that will be completed.

3.1 Water Level Monitoring

Water level measurements have been made throughout the mining operations. Water level measurements are made in monitoring wells monthly. Water level measurements collected in concert with water quality sampling can serve as quarterly water level measurements for the purposes of this monitoring evaluation plan.

Existing groundwater wells, listed in Table 1, have been used for gauging water levels and have been measured over time. Water level measurements are made with a water level indicator. The water level indicator signals at the top of the water in the well and is measured with the tape at the top of the PVC well casing. The measured water level is subtracted from the surveyed well elevation to determine the groundwater elevation. Water wells used for water level gauging are not used for groundwater quality sampling. However, groundwater quality wells may be used for water level gauging.

3.2 Water Quality Monitoring

Water quality monitoring wells are sampled on a quarterly basis for at least five consecutive quarters, Water quality samples are collected from the WQM wells listed in Table 2, in accordance with the Groundwater Sampling Plan. Water quality samples are analyzed for the parameters listed in Table 3. Approved baseline water quality parameters are included in the water quality data collection. Once baseline water quality data is obtained, all or only select number of water quality monitoring wells and parameters will be utilized for the collection of water quality data in the future.

This GWMP includes parameters from the Colorado Department of Public Health and Environment (CDPHE) Reg 41 – Basic Standards for Groundwater Tables 1 through Table 4. The water quality sampling parameters are listed in Table 3 in Appendix I.

LG Everist commits to obtain water quality samples on a quarterly basis for five quarters prior to exposing water during mining. The water quality data will be used as a baseline, while subsequent water quality data will be compared to the baseline data to assess water quality variations. Parameters with significant non-detects or are determined to be

unrelated to mining and/or mining activities may be petitioned to be omitted during the water quality assessment will be detailed in a baseline report. The report will include the baseline data, assessment analysis, and justification for any proposed modifications to the water monitoring plan based on the data.

The operator will submit the baseline report to the DRMS as a Technical Revision. The operator understands that any modifications to the water monitoring plan (including well locations and parameters to be tested, and sampling frequency) must be through the DRMS Technical Revision process and only with DRMS approval.

4.0 WATER QUALITY EVALUATION

The proposed water quality evaluation is based on statistical analysis, where the baseline data is compared to future samples. The date will be analyzed statistically to evaluate expected natural water quality variations within the aquifer. The statistical analysis is necessary to provide a means to evaluate the expected range of values in the representative baseline data, so that when future samples are obtained, variations outside the statistical norms can then be evaluated regarding the potential of water quality degradation from mining activities.

4.1 Baseline Data Collection

To initially evaluate the baseline data, a normal distribution and a 95 percent confidence interval around the mean will be used to establish a baseline range of values. This is standard statistical analysis commonly used for data management to establish an anticipated range of naturally occurring values that may occur in the aquifer. Water quality changes within the baseline data could be related to (a) seasonal variations, (b) changes in precipitation recharge, (c) spatial variations within an aquifer due to heterogeneous geologic conditions and/or (d) changes in water levels and hydraulic gradients with time that could affect water flow in the aquifer. Therefore, there may be a need to update the baseline data over time because the data has changed due to a particular change in natural conditions at the mining site.

It may be impractical to conduct extensive statistical analysis on every water quality parameter tested. A set of select water quality parameters can be used to identify potential water quality degradation. This set of select parameters will be used for statistical analyses and charting and will be approved by DRMS in a TR. After the initial five quarters of baseline data is collected, future sampling will occur twice per year (during periods of high flow and low flow and set 5-7 months apart) for the specific parameters. Prior to starting the mining, sampling will be conducted within 90 days.

The water quality sample results from future sampling events during the mining activities will be compared to the baseline data. A further in-depth review of the groundwater quality data will be needed to determine whether mining is resulting in the potential for any type of pollution in the aquifer.

4.2 Sampling Parameters

The sampling parameters listed in Table 3 are derived from CDPHE – Reg 41 Basic Standards for Groundwater, Tables 1 through Table 4. These parameters are analyzed for all baseline samples. The baseline sample data will be used to determine potential future changes in groundwater quality.

4.2.1 Selection of Parameters

The groundwater data obtained from baseline sampling will provide information that can be used to determine the appropriate parameters for statistical analysis, and which parameters should be excluded in future sampling events.

The proposed set of parameters will be determined after the baseline data is obtained. The set of parameters will be evaluated on an annual basis and if any anomalous trends develop for parameters, subsequent statistical analysis will be conducted to assess anomalous trends outside the expected naturally occurring water quality variability.

4.3 Statistical Analysis

The database of sample analytical results will be preliminarily assessed for representativeness. Any anomalous, or non-representative, water quality data will be excluded from the baseline data prior to conducting the statistical analysis. If data points are excluded, LGE will provide a written rationale to the Division for the exclusion. Once the representative database has been established, the baseline mean and standard deviation for each of the selected parameters will be calculated. The data collected will provide the standard deviation used to establish a control limit (95 % confidence interval around the mean), beyond which any changes in water chemistry for that parameter will be assessed to evaluate if conditions in the mining area may be affecting ground water quality.

It is proposed that "control charts" be constructed for each of the selected parameters in each of the water systems so that annual water quality data can be tracked to evaluate any potential trends in water quality. For all of the parameters there will be an upper control limit beyond which a significant change in ambient water quality can be assumed. It is also proposed that the stream standard for each of the selected parameters be shown on the control chart, as, for some parameters, stream standards may have already been exceeded in the background water quality, while, for other parameters, stream standards are above the expected range of natural variations in water chemistry.

The control charts and statistical analysis are prepared on an annual basis as additional water quality data become available from additional sampling events.

5.0 VERIFICATION RE-SAMPLING

Under certain circumstances a verification re-sampling may be collected, and samples submitted for analysis using the Groundwater Sampling Plan. The samples will be collected within four weeks of the analytical report date. A verification sample may be collected for the following sampling event depending on the frequency of sampling. Verification re-samples are designed to provide confirmation of the sample analytical data for sample result anomalies or statistical analysis.

6.0 REPORTING

A report will be submitted to DRMS within 60 days after the fifth groundwater quality sample is collected. The report will include a summary of the data collected, statistical data, and a description of the assessment of data. Control charts are the preferred statistical method for presenting the data. The control charts will be done on all the data to date. Future sampling reports will be provided to DRMS on an annual basis or at another approved frequency.

If confirmed exceedances of the statistical methods (control charts) are noted after regular annual sampling, a specific response plan will be prepared by LGE to address that issue. The specific response plan will include an evaluation of the number of selected parameters that show exceedances, the potential variability in the level of exceedances, and the duration of these exceedances.

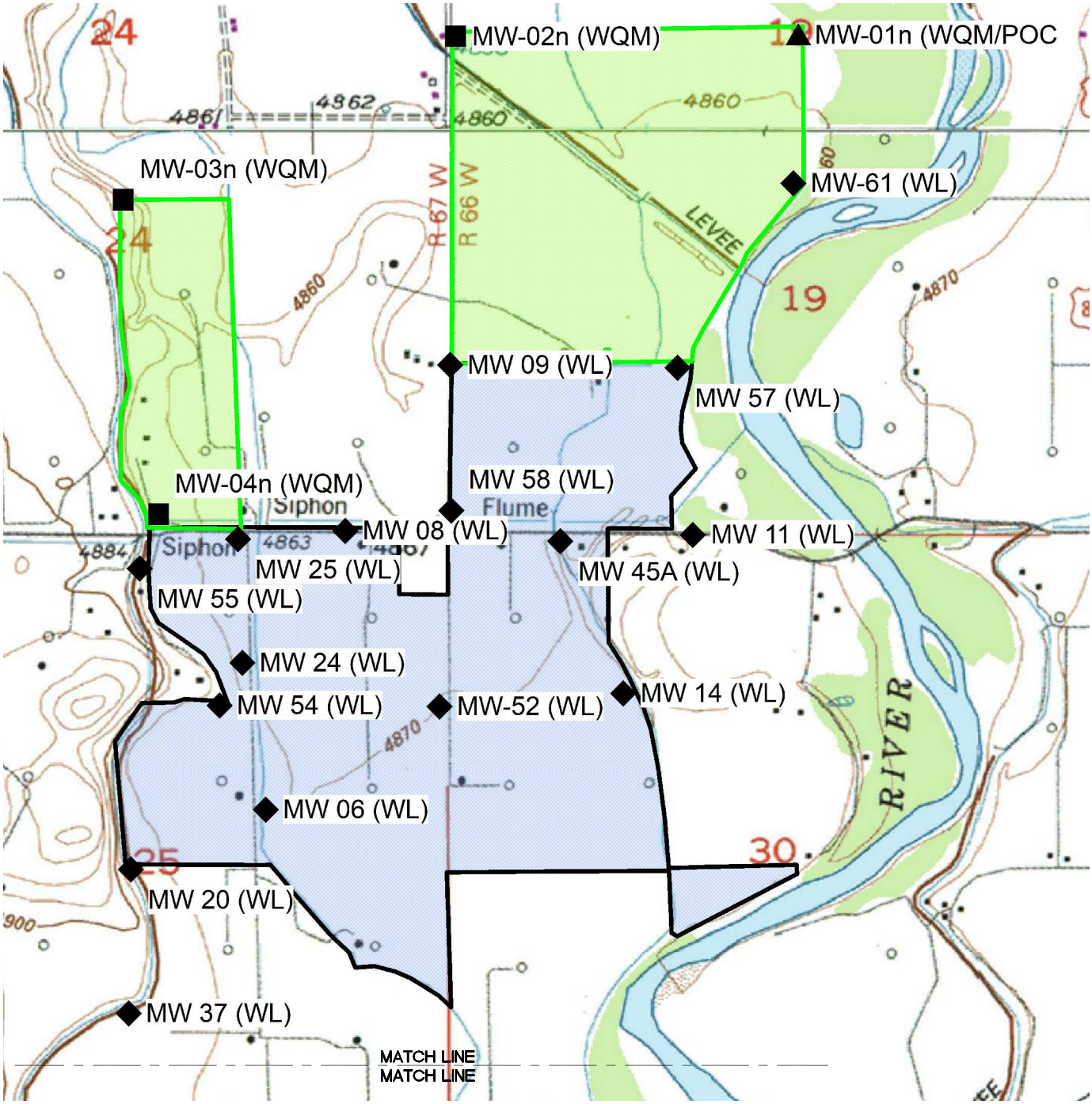
Figures

Figure 1 – Monitoring Wells

L.G. Everist, Inc.

FORT LUPTON SAND AND GRAVEL

EXHIBIT G2n - MONITORING WELLS



AMENDMENT AREA (202.26 AC. ±)

EXISTING PERMIT AREA

NOTES

1. Data from existing monitoring water level wells is provided with annual reports.
2. Existing MW locations shown on the map are confirmed via ground check.
3. WQM well locations shown on map are confirmed via ground check.

WELL KEY

- ◆ Site Monitoring Well
- ■ WQM Well
- ▲ WQM/POC Well

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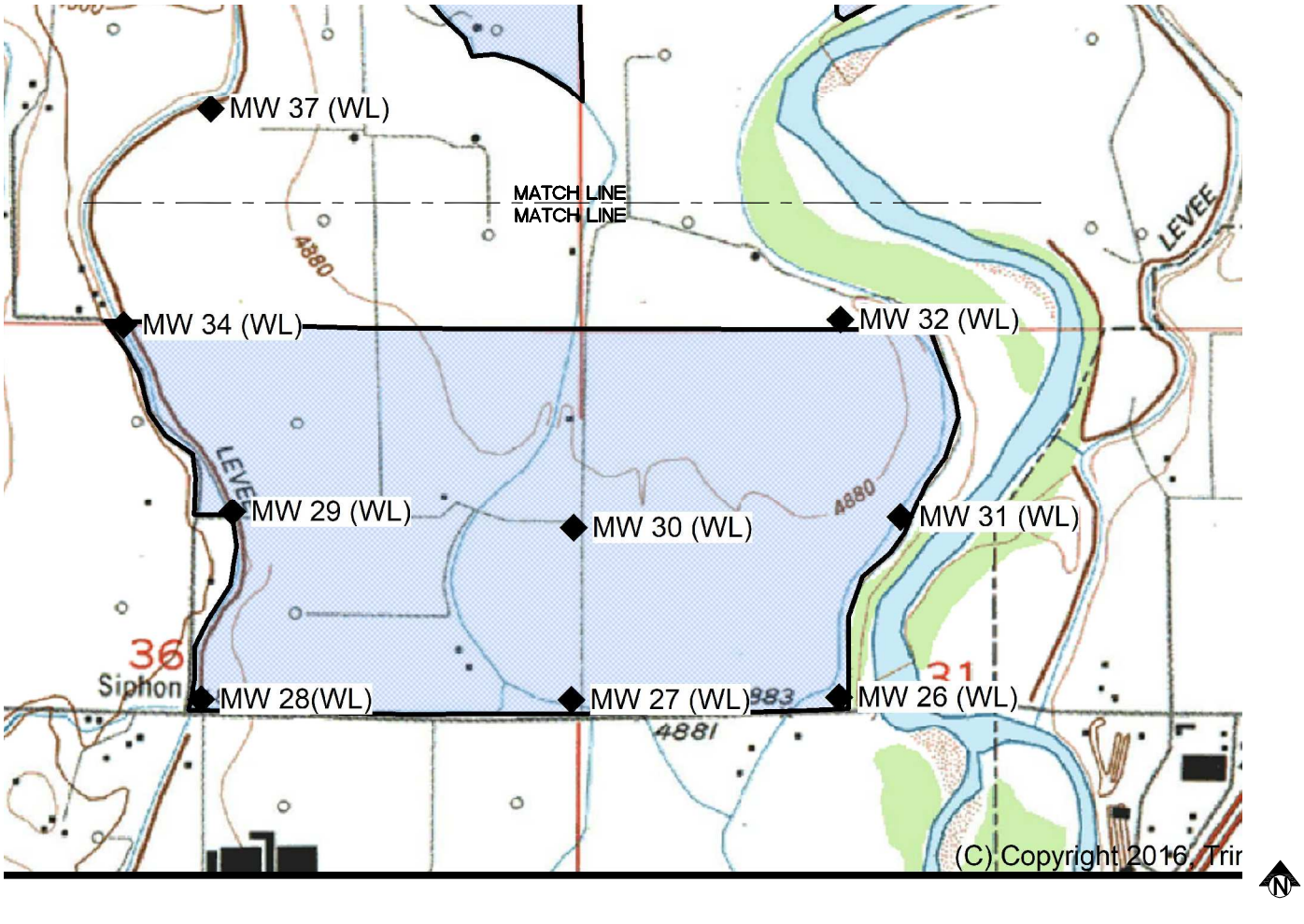
L.G. Everist, Inc.

FORT LUPTON SAND AND GRAVEL

EXHIBIT G2s - MONITORING WELLS



WELL KEY

- Site Monitoring Well
- WQM Well

EXISTING PERMIT AREA

NOTES

1. Data from existing monitoring water level wells is provided with annual reports.
2. Existing MW locations shown on the map are confirmed via ground check.
3. WQM well locations shown on map are confirmed via ground check.

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Appendix A

Sampling Parameter List

Table 3: Sampling Parameter List

Analyte	Table Value Standard (mg/L unless other units given)	Reg. 41 Table Reference (1-4)
pH Field (pH unit)	6.50 - 8.50	2 and 3
Coliforms Total (30 day average)	2.2 org/100 ml	1
Corrosivity	noncorrosive	2
Phenol	0.3	2
TDS	400 mg/L or 1.25X background	4
Aluminum - Dissolved	5	3
Antimony - Dissolved	0.006	1
Arsenic - Dissolved	0.01	1
Barium - Dissolved	2	1
Beryllium - Dissolved	0.004	1
Boron - Dissolved	0.75	3
Cadmium - Dissolved	0.005	1
Chloride - Dissolved	250	2
Chromium - Dissolved	0.1	1 and 3
Cobalt - Dissolved	0.05	3
Copper - Dissolved	0.2	3
Fluoride - Dissolved	2	3
Iron - Dissolved	0.3	2
Lead - Dissolved	0.05	1
Manganese - Dissolved	0.05	2
Mercury - Dissolved	0.002	1
Molybdenum - Dissolved	0.21	1
Nickel - Dissolved	0.1	1
Nitrate (NO3)	10	1
Nitrite (NO2)	1	1
Nitrite + Nitrate as Nitrogen	10	1
Selenium - Dissolved	0.02	3
Silver - Dissolved	0.05	1
Sulfate - Dissolved	250	2
Thallium - Dissolved	0.002	1
Uranium - Dissolved	0.0168 to 0.03	1
Vanadium - Dissolved	0.1	3
Zinc - Dissolved	2	3

Appendix B

Groundwater Sampling Plan

Groundwater Sampling Plan

LGE - Fort Lupton

10482 County Road 32.5

Platteville, CO

May 17, 2023

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1.0 PURPOSE

This technical procedure for groundwater sampling establishes a standard methodology for collecting groundwater samples for laboratory analysis which are representative of aquifer water quality.

2.0 APPLICABILITY

This technical procedure is applicable to field personnel engaged in the collection of groundwater samples from wells for the purposes of laboratory analysis. This document should be read in conjunction with all regulatory, work plan, orders, client-specific requirements, and other project-specific guidelines.

3.0 RESPONSIBILITIES

3.1 Sampling Personnel

Sampling Personnel are responsible for sample collection, sample custody in the field, sample preservation, total and accurate completion of field and data sheets, field parameter measurements, sample delivery, and data delivery to the Project Manager, as described in this technical procedure.

3.2 Task Manager

The Task Manager is responsible for supervising Sampling Personnel. Supervision includes ensuring that samples are collected, documented, preserved, field analyzed, handled and shipped or delivered to the appropriate laboratory as specified in project work documents and this technical procedure.

3.3 Project Manager

The Project Manager is responsible for overall management of the project, sampling program design and implementation and providing any required clarifications in the use of this procedure. In most cases, the Project Manager will also fill the role of Task Manager.

4.0 GROUNDWATER SAMPLING PROCEDURES

4.1 Preparation for Sampling

Following the determination of a sampling event date, sample bottles will be ordered from the contracted analytical laboratory. Sampling personnel will coordinate with the

contracted lab so that sample bottles can be ordered in sufficient time for shipping, bottle inspection, and corrections. If any changes have been made to the site analyte list, the laboratory should be informed prior to bottle shipment.

Sufficient sample bottles for each parameter group (total metals, anions, etc.) for each well will be verified upon receipt. Additional bottles for Quality Assurance/Quality Control *(QAQC)* samples (duplicates, trip blanks, field blanks, and/or equipment blanks) will also be arranged, as necessary, with the laboratory prior to shipment. The laboratory will also provide sample labels, chain-of-custody (COC) forms, and COC seals with delivery of the sample bottles.

4.2 Field Work Prior to Sampling

Sampling personnel will inspect each well prior to sampling. The condition of the well casing, concrete pad, reference mark for water level measurements, protective steel casing, well identification markings, and security lock will be recorded. Additionally, the following will be recorded on a sampling data sheet (Appendix I) for each monitor well:

- Observations made during visual inspection.
- Static water level of well measured with electronic signal on measuring tape.
- Total depth of the well measured or recorded from previous events.
- Date and time of well measurements and well sampling
- Purge water volumes calculated or rate of purging, if needed.
- Observation of sample odor, presence of immiscible layers, and relative turbidity

Prior to purging and groundwater sampling of any well, the static water level will be measured in the monitor well. The water levels for all the groundwater monitoring network wells will be measured on the same day or within a 36-hour period of time. In addition to the water levels, total depth will be measured annually in all wells in the monitoring network. Water level and total depth measurements will be made to the nearest 0.01 foot from a dedicated reference mark on the riser pipe using a portable electric water level indicator and will be re-measured for consistency. Depths to water will be compared in the field to previous measurements to minimize the possibility of recording incorrect readings.

To avoid potential cross-contamination, the water level probe and tape will be washed before the initial use and between well locations using an Alconox™/water solution followed by a rinse with distilled water, or use of a disposable alcohol water swab. A pair of new disposable gloves (nitrile or latex) will be worn while performing groundwater level measurements.

If the total depth measurement indicates that 25% or more of the effective screen length of a well has become filled in with sediment, the well will be re-developed. Re-

development will consist of purging a minimum of five casing volumes from the well, or purging the well dry twice if the yield is insufficient for continuous purging. In wells with sufficient yield, purging will continue until the sediment is removed and field parameters (pH, temperature, and conductivity) stabilize. Parameters are considered stabilized when there is less than a ±10 percent change in three consecutive measurements of temperature and conductivity, and pH readings are within ±0.2 standard units. For wells that purge dry, field parameters will be measured at the start and end of both purging cycles, if possible.

The volume of water standing in each well will be calculated using the static water level measurement, the total depth of the well, and the casing diameter. One casing volume will be considered the water present in the well casing. Well depths for the purpose of well volume determination will be obtained from well completion records. The equation for calculation of one casing volume is:

$$V = [\pi \times (r_{casing})^2 \times h] \times 7.48$$
$$V = 0.16 \times h \text{ for a 2 inch well}$$

where:

V =	volume of water in well casing [gallons]
r_{casing} =	radius of well casing [feet]
h =	height of water column (total well depth - depth to water) [feet]

4.3 Sample Collection

4.3.1 Decontamination

All re-useable, non-dedicated sampling equipment will be decontaminated between each well location to provide representative samples. Decontamination will be performed by washing all equipment with an Alconox™/water solution followed by a rinse with distilled water. Water generated from decontamination procedures will be disposed of at least 20 feet from the well site. All clean or unused sampling equipment will be handled by personnel wearing new disposable gloves (e.g., nitrile or latex). After the re-useable sampling equipment has been decontaminated it will be wrapped in new clean plastic sheeting or placed in new clean plastic bags. The sampling equipment will remain in plastic sheeting or bags until it is used again at the next sampling event.

4.3.2 Sampling Equipment and Materials

Purging and sampling equipment will consist of bailers and/or pumps. The bailers may be disposable or dedicated, and the pumps either dedicated or re-useable, to be decontaminated prior to each sample location, or dedicated. This

equipment will be constructed of materials that will not alter the quality of the groundwater samples. Other sampling equipment may include the following:

- Water level indicator;
- Combination water quality meter for measuring pH, temperature, and conductivity;
- Water quality meter calibration solutions;
- Disposable gloves (nitrile, latex, or other appropriate material);
- Distilled or deionized water;
- Phosphate-free environmental detergent such as Alconox™;
- Spray bottles for decontamination solution wash and rinse;
- Peristaltic pump with associated tubing;
- Battery or power for peristaltic pump;
- 0.45-micron filter(s) if field-filtering is necessary;
- Plastic sheeting to prevent possible contamination of sampling equipment;
- Ziploc™ freezer bags for sample storage and shipping;
- Paper towels;
- 5-gallon plastic buckets for decontamination and purge volume measurement;
- Sample bottles and sample preservatives;
- Field forms including groundwater sampling data sheets, COC forms, and sample labels;
- Coolers and ice.

All of the groundwater purging and sampling equipment will be maintained in a clean and working condition. Sampling personnel will wear new disposable gloves while handling the sampling equipment that will be in contact with water samples.

4.3.3 Purging

Prior to sample collection, each well will be purged of stagnant water using disposable or dedicated sampling equipment such as bailers and rope. Bailing will be performed at a rate that will minimize agitation of recovery waters and will continue until a minimum of three casing volumes have been purged and field parameters (pH, temperature, and conductivity) have stabilized, or the well is bailed dry.

Field parameters will be measured at a frequency no greater than once per casing volume and purging will continue until there is less than ±10 percent change in three consecutive measurements of temperature and conductivity, and pH readings are within ±0.2 standard units. If a well is bailed dry before removing three casing volumes, sample collection will begin when a sufficient amount of groundwater has entered the well. In this situation, field parameters will be measured at the start of sample collection and again after sample collection is

complete, if possible. The collection of these groundwater samples must be within 24 hours of purging.

All field parameter measurements will be recorded on a field data sheet along with a description of the sample appearance at the time of field parameter measurement. The water quality meter used to measure field parameters will be calibrated according to manufacturer's recommendations prior to purging.

Purge water generated during sampling events will be discharged on the ground, at least 20 feet from the well site, unless previous analyses have indicated that groundwater contamination has occurred at that well location. If previous analytical results indicate that groundwater contamination has occurred, purge water may need to be containerized and disposed of in accordance with state and federal regulations.

4.3.4 Withdrawal of Sample

After purging is completed, sampling personnel will re-glove with new disposable gloves in preparation for sample collection. Sample containers will be filled based on parameter sensitivity to volatilization and pH change as follows:

- Other organics (SOCs)
- Dissolved Metals
- Anions/Cations
- Other inorganics and miscellaneous analytes

Monitor wells will be sampled for analysis of the Regulation No. 41- The Basic Standards for Ground Water 5 CCR 1002-41, Colorado Department of Public Health and Environment Water Quality Control Division. Tables with parameters from the Reg 41 Standards are provided in Attachment 2. Portions of the list will be determined for specific sampling events and is limited to parameters listed in Table 1 through Table 4.

Some low yield wells may produce insufficient volume to fill all of the sample containers within 24 hours of purging. Sample containers for these wells will be filled in the order listed above until the sample volume is depleted. Filled bottles will be submitted to the laboratory for limited analysis.

VOC samples will be collected in 40 milliliter glass vials, SVOC and PAH samples will be collected in glass sample containers appropriate to the laboratory's analytical capability. Metals and other inorganic samples will be collected in plastic or glass containers of appropriate capacity. New sample containers with appropriate preservatives will be provided by the analytical laboratory.

Every effort will be made to reduce contact between the bottles and sampling equipment. As an added precaution, contact time of the sample with ambient air will be minimized by replacing caps immediately after the bottles are filled. If VOC samples are collected, it will be done without air bubbles. This will be achieved by adding sample slowly until a convex meniscus form at the top of the vial (i.e., the vial is slightly overfilled) before replacing the cap. Once the cap is firmly attached, the vial will be inverted and examined for air bubbles.

Metal samples will be field filtered when possible, utilizing a peristaltic pump and 0.45-micron filters. Sometimes field filtering will not be possible, and samples will be submitted for laboratory for filtering prior to analysis.

Following completion of groundwater sampling at each monitor well, all re-usable, non-dedicated sample equipment will be decontaminated in accordance with the procedures specified above in Section 4.2.1.

4.4 Sample Preservation, Handling, and Shipment

Groundwater samples will be preserved as follows:

- VOCs (if sampled) – hydrochloric acid (HCl) or no preservative
- Dissolved Metals - none
- Anions/Cations - none
- Other organics and inorganics – none

Preservatives will either be included with the sample containers in small vials or will be pre-added to the sample containers by the laboratory. If the preservatives need to be added to the sample containers, sampling personnel will place the specified volume of preservative to the container during the sampling. Sample filtration may need to be performed in the field or in the analytical laboratory.

After sample collection, filled and capped containers will be wiped clean, appropriately labeled, and stored with ice or frozen icepacks in insulated coolers. Sufficient ice or icepacks will be added to the coolers to maintain sample temperatures at or below 4°C. Packing material will be added to the coolers as necessary to prevent breakage of glass containers when they are shipped.

At the end of each day of sampling, collected samples will be delivered or shipped to the analytical laboratory. A completed and signed COC form will accompany all samples contained within the cooler. The COC will be kept preventing moisture damage and may need to be sealed inside a gallon-size Ziploc™ bag and placed in the cooler for shipment. If the sample cooler is shipped for overnight delivery, the cooler will be sealed

with shipping tape and a signed COC seal, provided by the laboratory, will be affixed to the outside of the cooler.

Sampling schedules and deliveries or shipments to the laboratory will be coordinated such that every attempt will be made to meet the recommended holding times of the analyses. Laboratory analyses performed outside the recommended holding times will be flagged or qualified appropriately in the report of analyses provided by the laboratory.

4.5 Chain-of-Custody of Samples

EPA-accepted chain-of-custody (COC) procedures will be followed to maintain the validity of the groundwater samples being delivered to the laboratory. From the time the empty sample containers leave the laboratory until the issuing of the laboratory results, the samples and/or sample containers will be: 1) in sight of the assigned custodian, or 2) locked in a tamper proof location, or 3) sealed with a tamper proof seal. A written record of sample container possession and transference of samples will be documented on appropriate COC forms. The forms will also be used as a mechanism of communication between the sampling personnel and the analytical laboratory to note any specific details or requirements regarding the requested laboratory analysis. At the completion of the sampling event, a copy of the completed COC form, signed by all the appropriate entities handling the samples, will be retained with the laboratory report.

4.6 Quality Assurance and Quality Control

Quality assurance (QA) and quality control (QC) procedures will be followed so that laboratory preparation, field sampling, and transport activities do not bias the results of the chemical analysis. QA/QC samples are collected to provide a quantitative basis for evaluating the analytical results. Typical QA/QC samples collected for groundwater sampling programs may include one or more of the following:

Duplicate Sample - Duplicate samples are collected by the sampling personnel in a manner identical to the primary sample. The duplicate sample will be analyzed by the laboratory just as the primary sample is analyzed. The duplicate is intended to verify that the results from the primary sample are accurate and reproducible.

Trip Blank - A trip blank consists of an analyte-free water sample prepared by the laboratory. The trip blank will accompany the sample container shipment from the laboratory to the field and back. At no time will the trip blank container(s) be opened in the field. Trip blanks will be analyzed by the laboratory only for volatile organic compounds.

Field Blank - A field blank consists of empty sample bottles filled with distilled or deionized water at the sample site by sampling personnel. The field blank will also be analyzed by the laboratory as if it was a "real" sample.

Equipment Blank - A variation of the field blank is the equipment blank. Equipment blanks are prepared in a manner identical to field blanks, except that distilled or deionized water is poured through clean (field decontaminated) sampling equipment and into the sample bottle. Equipment blank samples are analyzed for all analyses and are used to verify that sampling equipment is uncontaminated.

At least one of the QA/QC sample methods will be conducted every 4 sample events, one in four, during the first five years of sampling.

5.0 Analytical Procedures

Volatile organic constituents (VOCs) will be analyzed in accordance with Method 8260 of EPA Report SW-846, *Test Methods for Evaluating Solid Waste,* while inorganic constituents will be analyzed by Method 6010 of SW-846, or other appropriate EPA methods. Reporting limits (RLs) for the parameters analyzed will be the lowest concentrations that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions and will be below any promulgated maximum contaminant levels (MCLs). Instrument detection limits will be kept at or below the RLs. Some analytical results may be reported below the RL and above the Method Detection Limit (MDL) with an estimated value. These results will be flagged, and the result determined as an estimate and not a reported value.

6.0 Analytical Data Review

Upon receipt of the analytical results, general analytical data evaluation (i.e., data validation) will be performed. At a minimum, this evaluation will address the following:

- Overall data completeness;
- A review of laboratory qualified data;
- Comparison of field duplicate results to original sample results;
- Comparison of trip blank and method blank results to sample results;
- Review of data accuracy based on cation-anion balances, etc.; and
- Review of laboratory QA/QC sample results including comparison to spike recoveries to control limits.

Results of the data review will be documented and used to initiate additional review by the laboratory or possibly addition qualifications of the analytical data by the reviewer.

Appendix A

Sample Field Data Sheet

GROUND WATER SAMPLING FIELD DATA SHEET

SAMPLER _____ ASSISTANT _____

SITE _____ PROJECT MANAGER _____

Well No.	Date:	Time:	Personnel:
Weather:		Well Inspection (condition)	
Casing Diameter (in)	Casing Stick-up: (ft)	Meter Calibration:	Sampling Kit:

Static Water Level: (from top of casing) (ft)	Total Well Depth: (from top of casing) (ft)	Sample ID:	Time Taken	Preservative	Field Filtered	Analysis
Saturated Thickness:(ft)	Casing Volume: (gal)					
Purging Equip.	Purge Rate (if pump used)					

Purge Parameters:

Time	Temp (F^o)	EC (mS/cm)	DO %	DO (mg/L)	pH	pH mV	ORP	Turbidity
Well evacuated to dryness? (Y/N)			Time to recarge well?					

Sampling Information (from above):

Time	Temp (F^o)	EC ($mS/cm^{3)}$)	DO %	DO (mg/L)	pH	pH mV	ORP	Turbidity
Immiscible Layer (Y/N)				Sample Odor:				

Sample Appearance: _____

_____

Description and Notes: _____

_____

_____

_____

Checked by:		Date:	

MOLEN & ASSOCIATES