2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill at the TransAlta Centralia Mine, near Centralia, Washington

Prepared for

TransAlta Centralia Mining LLC

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This report has been certified by a Hydrogeologist
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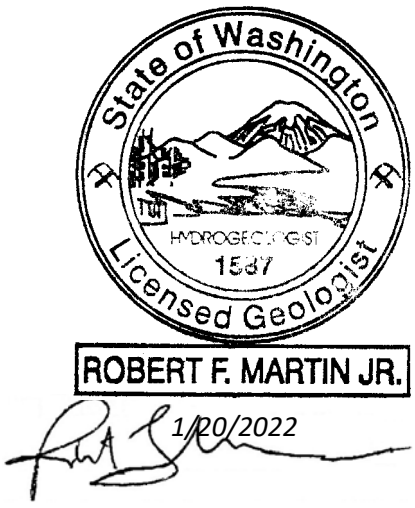

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Acronyms and Abbreviations

°C	degrees Celsius
CCR	coal combustion residuals
CCR SAP	*Groundwater Monitoring Sampling and Analysis Plan for the Limited Purpose Landfill at the TransAlta Centralia Mine*
CFR	Code of Federal Regulations
DQR	Double Quantification Rule
EPA	U.S. Environmental Protection Agency
HNO_3	nitric acid
LPLF	Limited Purpose Landfill
mg/L	milligram per liter
SSI	statistically significant increase
SWFPR	sitewide false positive rate
TCM	TransAlta Centralia Mine
UPL	Upper Prediction Limit
WAC	Washington Administrative Code

SECTION 1

Introduction

This section summarizes the 2021 annual report's purpose and objectives, the document organization, and provides the site description and the status of the monitoring program.

1.1 Purpose and Objectives

This document is the 2021 annual report for the Limited Purpose Landfill at the TransAlta Centralia Mine (TCM), as required per *CCR Groundwater Monitoring and Corrective Action* of 40 Code of Federal Regulations (CFR), 257.90(e), *Annual Groundwater Monitoring and Corrective Action Report*. Per the CCR Rule, the minimum requirements for each annual report submittal must include the following (as itemized per 40 CFR 257.90(e) [items 1 through 5]):

1. A map showing the Coal Combustion Residuals (CCR) unit (landfill) and the designated CCR groundwater monitoring network, including upgradient and downgradient wells with well identification numbers
2. The identification of monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description, and the reasons those actions were taken
3. A summary of the groundwater samples that were collected for analysis for each upgradient (or background) and downgradient well, the dates the samples were collected, and whether the sample was required by the detection or assessment monitoring program
4. A narrative discussion of transition between monitoring programs (the date and circumstances of transitioning from detection phase to assessment monitoring), if applicable
5. Other information required per 40 CFR 257.90 through 257.94, interpreted to include the following:
   - A map showing groundwater elevations, inferred groundwater elevation contours, and inferred groundwater flow direction from the sampling events conducted during the year
   - A groundwater elevation hydrograph, including data over the period of record
   - Groundwater flow rates for the semiannual events conducted during the preceding year
   - Results from data quality review and data validation
   - A summary of the statistical method and the respective background (compliance) limits for Detection Monitoring (Appendix III) constituents
   - A summary of any Appendix III constituents that are identified as a statistically significant increase (SSI) greater than background levels

In addition to this technical information, the annual report must also include narrative of the following items:

- Documentation of the status of the monitoring program (that is, detection or assessment phase)
- Key actions completed for the preceding calendar year including alternative source demonstrations
- A description of problems encountered, and actions taken to resolve the problems (if needed)
- Key activities anticipated for the upcoming year

The annual reports are due by January 31 and summarize monitoring results from the preceding year. The CCR Rule requires specific reports and notifications throughout the monitoring process, with up to three forms of submittals:

- The site's operating record (40 CFR 257.105)
- Notifications to the State Director (40 CFR 257.106)
- The publicly accessible internet site (40 CFR 257.107)

1.2 Document Organization

The document is organized into the following sections:

- **Section 1. Introduction.** Presents the document purpose and objectives, site description, and status of monitoring program.
- **Section 2. Monitoring Program Description.** Summarizes the groundwater monitoring system design (well network) and the sampling program for the Limited Purpose Landfill.
- **Section 3. Groundwater Monitoring Results.** Summarizes the groundwater monitoring information related to background data collection and the initial compliance event, and provides a map showing groundwater elevations and inferred flow direction, estimates of groundwater seepage velocity, and a summary of groundwater quality results for the initial compliance event.
- **Section 4. Statistical Evaluation.** Summarizes the statistical method and the compliance limits and compares the initial compliance results to the compliance limits to determine whether there is an SSI greater than background conditions for the Appendix III constituents.
- **Section 5. Alternative Source Demonstration**. Summarizes statistically significant exceedances the detection monitoring results, retesting, confirmation, and documentation of an alternative source demonstration for the confirmed values.
- **Section 6. Summary.** Summarizes the key points of the initial annual report per the CCR regulatory requirements.
- **Section 7. References.** Lists the documents referenced to develop this report.

1.3 Site Description

TCM manages the Limited Purpose Landfill, which is approximately 7 miles east of Centralia, Washington (Figure 1). The Limited Purpose Landfill is north of Pit 7 in the Centralia Mine. The site is in the southern half of Section 33, Township 15N, Range 1W; Latitude 46°44'23" North, Longitude 122°49'55". The site address is 913 Big Hanaford Road, and the Property Tax Parcel (Account) Number is 023387001000. The permitted area encompassing the Limited Purpose Landfill is 57 acres, and the actual footprint of the waste disposal area is 18 acres (Figure 2). The Limited Purpose Landfill consists of the waste disposal area, and the surface impoundments immediately south of the waste disposal area to manage leachate generated at the disposal cell.

TransAlta Centralia Generation LLC operates a coal-burning power plant that is located adjacent to TCM and generates residual ash waste; the residual ash waste is disposed of into the Limited Purpose Landfill. The construction of Stage 1 began during the summer of 2009, and the Lewis County Environmental Health Department authorized TCM to begin waste disposal operations effective October 31, 2009. On December 21, 2009, the Lewis County Environmental Health Department amended the facility permit to approve the disposal of residual ash waste in Stage 1 Area A3a, in addition to Areas A1 and A2, which had been approved for disposal in the original permit. The Stage 2 Area of the Limited Purpose Landfill

was constructed in three phases from 2011 through 2014 and was subsequently approved for the receipt of ash waste material.

1.4 Status of the Groundwater Monitoring Program

The groundwater monitoring program is currently in the detection phase, as described under 40 CFR 257.94, *Detection Monitoring Program*.

In 2019, the background levels for the Appendix III constituents listed for detection monitoring was updated. The resultant UPLs represent a longer period of monitoring providing an additional 5 monitoring events. Due to the complex behavior of groundwater and need for sufficiently large sample sizes, the EPA Unified Guidance recommends that background levels should be evaluated and possibly updated every four to eight measurements.

Groundwater monitoring was conducted May 19, 2021 and October 19, 2021 for biannual monitoring. Resampling was conducted after the May 19, 2021 event on June 21, 2021 for an exceedance for boron in wells LPLF-2R and LPLF-8, and for total dissolved solids in LPLF-2R. Resampling was conducted after the October 19, 2020 sampling event on December 1, 2021 for boron in wells LPLF-2R and LPLF-8 and for total dissolved solids in well LPLF-2R. The resampling results were used in an alternative source demonstration, as documented in Section 5 of this report. Based on the demonstrations, the SSI are determined as a result of natural variation in groundwater concentrations from the resaturated spoils beneath the facility.

SECTION 2

Monitoring Program Description

This section summarizes the CCR groundwater monitoring program for the Limited Purpose Landfill.

2.1 Monitoring Program

Groundwater is monitored in accordance with the CCR SAP (CH2M, 2016). Details regarding the site hydrogeology, the stratigraphic sequence, the uppermost aquifer, and the lower aquitard/confining unit are presented in the groundwater monitoring system design document (CH2M, 2017a) posted to the publicly available website and are not reiterated herein. Details regarding the monitoring network, sampling, and field/laboratory quality control are described in the following sections.

2.2 Monitoring Network

Effective April 17, 2015, the CCR regulations (specifically, 40 CFR 257.91, *Groundwater Monitoring Systems*) require a facility to install a detection groundwater monitoring system at appropriate locations and depths to yield groundwater samples from the uppermost aquifer and monitoring of all potential contamination pathways. At least one upgradient well must accurately represent the quality of background groundwater unaffected by potential leakage from the CCR unit. The regulations also state that at least three downgradient wells must accurately represent the quality of groundwater passing the waste boundary for the detection of potential groundwater contamination in the uppermost aquifer.

Table 1 summarizes the groundwater monitoring well network and construction details for the Limited Purpose Landfill. Figure 2 shows the designated CCR groundwater monitoring network, which consists of five wells screened in the uppermost aquifer and located around the perimeter of the ash disposal area. Monitoring well LPLF-1 and LPLF-5 are effectively upgradient of the landfill and used to characterize background conditions unaffected by the landfill, and wells LPLF-2R, LPLF-7R, and LPLF-8 are downgradient and designated as compliance wells. As noted in Section 1.4, documentation of the CCR *Groundwater Monitoring Systems* design was submitted to the publicly available website in October 2017, as described in the *Coal Combustion Residual Groundwater Monitoring System Certification for the Limited Purpose Landfill at the Centralia Mine near Centralia, Washington* (CH2M, 2017a).

2.3 Groundwater Level Measurement

Static groundwater level measurements are collected during each monitoring event to calculate groundwater elevations, estimate groundwater flow direction, and calculate the groundwater seepage velocity. Groundwater elevations are calculated by subtracting the field measured static depth to water from the surveyed top-of-casing elevations relative to the local vertical datum (NAD 27, Washington State Plane, North 3601, Feet Intl). Field-measured groundwater levels are recorded on field forms (provided in Appendix A) and the groundwater level data are presented in Section 3.

2.4 Groundwater Sampling

Each well is equipped with dedicated tubing to facilitate low-flow sampling methods, except for LPLF-1, which is bailed to collect the sample. A peristaltic pump is used to support sampling methods required for low-flow (minimal drawdown) groundwater sampling procedures as described under *Groundwater Sampling Guidelines for Superfund and RCRA Project Managers* (EPA, 2002). In accordance with the low-flow method, purging continues until field parameters have stabilized to acceptable tolerances as outlined in the CCR SAP (CH2M, 2016b). Field parameters are measured using factory-calibrated multiparameter probe. Appendix A includes copies of field sampling forms for sampling events conducted in 2021.

Groundwater samples were collected in laboratory-provided sample containers. Below are the test methods, reporting limits, and preservatives to collect groundwater samples for the Appendix III constituents for detection monitoring.

Constituent	Analytical Test Method	Reporting Limit (mg/L)	Preservative
Boron	EPA 6010C	0.01	HNO_3
Calcium	EPA 6010C	0.05	HNO_3
Chloride	EPA 9056A	2.5	Chill to 4°C
Fluoride	EPA 9056A	0.05	Chill to 4°C
pH	SM 4500H B	0.1	Chill to 4°C
Sulfate	EPA 9056A	10	Chill to 4°C
Total Dissolved Solids	SM 2540C	1	Chill to 4°C

°C = degrees Celsius
HNO_3 = nitric acid
mg/L = milligram per liter

Laboratory analyses were performed by an accredited and certified testing laboratory (ALS, from Kelso, Washington).

2.5 Field and Laboratory Quality Control

As described in the CCR SAP (CH2M, 2016b), field and laboratory quality control are guided by the field quality control procedures that included sample labeling, chain-of-custody documentation, and sealing of sample containers following sample collection. Field duplicate and matrix spike (with duplicates) samples are collected during each sampling event. Temperature and method blanks are included with each shipment.

Laboratory quality control procedures included analysis of method blanks, surrogates, duplicates, and matrix spike/matrix spike duplicates. Results from the laboratory quality control are included in the analytical data packages and are included in Appendix B.

SECTION 3

Groundwater Monitoring Results

This section summarizes the groundwater monitoring results related to the dates of sampling for the monitoring events, groundwater elevations, groundwater flow direction, the estimates of groundwater seepage velocity, and the groundwater quality results from the monitoring events.

3.1 Compliance Monitoring Events

The CCR Rule requires at least eight background groundwater monitoring events before the October 17, 2017, deadline to establish background conditions. Monitoring events after the eighth background event are considered initial detection-phase compliance monitoring to determine whether there is an SSI greater than background conditions. Below is a summary of the compliance and resampling events and the respective constituent suites for the sampling events. In 2021 an additional 2 monitoring events were included in the re-evaluation and determination of groundwater conditions.

Monitoring Event Type/Purpose	Date Completed	Appendix III, Detection Monitoring Constituents	Resampled Wells
Detection/Compliance	May 19, 2021	Yes	NA
Resampling/Confirmation	June 21, 2021	2 Constituents (boron and TDS)	LPLF-2R, LPLF-8
Detection/Compliance	October 19, 2021	Yes	NA
Resampling/Confirmation	December 1, 2021	2 Constituents (boron and TDS)	LPLF-2R, LPLF-8

3.2 Groundwater Levels and Hydrographs

Table 2 summarizes the groundwater measurements from the 2021 groundwater monitoring program. Figure 3 shows the groundwater elevation hydrograph from the CCR network wells from the initial monitoring events conducted from November 2016 through December 2021. In general, groundwater elevations are relatively similar to historical levels. Continued monitoring will be used to assess the need to evaluate seasonal patterns, characteristics, or apparent trends in the site hydrograph.

3.3 Groundwater Flow Direction

Figures 4 and 5 show the elevation contours and inferred flow direction for the groundwater conditions at the site for May and October 2021, respectively. The groundwater in the uppermost aquifer beneath the Limited Purpose Landfill generally flows to the southwest. Well LPLF-5 had a measurable water level during the October 19, 2021 sampling event but with insufficient volume to collect a sample for analysis. Well LPLF-5 was dry during the May 19, 2021 sampling event. A flow direction to the southwest is consistent with historical groundwater monitoring results.

3.4 Groundwater Flow Velocity Estimates

The estimated groundwater seepage velocity is 5 feet per year, which is based on the following equation and hydraulic assumptions and groundwater elevations in the uppermost aquifer:

$$v = \frac{K_a i}{n_e}$$ Equation from Fetter, 1994

where:

v	=	groundwater velocity (seepage velocity)
K_a	=	average horizontal hydraulic conductivity
i	=	horizontal hydraulic gradient
n_e	=	effective porosity

- An average hydraulic conductivity estimate of 0.11 feet per day (equivalent to 3.88 x 10^{-5} centimeters per second), which is based on slug test analyses and as summarized in the *Coal Combustion Residual Groundwater Monitoring System Certification for the Limited Purpose Landfill at the Centralia Mine Site near Centralia, Washington* (CH2M, 2017a).
- Hydraulic gradient was consistently 0.02 feet per foot, as measured from Figures 4 and 5. This value is considered a typical but lower value based on previous monitoring performed under the pre-existing WAC program since 2007
- Effective porosity of 0.15 (assumed value generally representative of mine spoils)

3.5 Groundwater Quality Results

Table 3 presents the groundwater quality results for the Appendix III constituents from the 2021 groundwater monitoring and resampling events. Groundwater data from the monitoring events are compared to the background conditions per the selected statistical method to determine whether the initial compliance values exceed background concentrations, as presented in Section 4. Resampling was conducted to confirm parameters that represented statistically significant exceedances for those wells and parameters identified.

3.6 Data Quality Assessment

The groundwater quality data were reviewed to assess the representativeness and usability of data before performing statistical evaluations as presented in Section 4. The method for performing the data quality review is documented in the CCR SAP (CH2M, 2016b) and follows procedures in the U.S. Environmental Protection Agency (EPA) *National Functional Guidelines for Inorganic Superfund Methods Data Review* (EPA, 2016).

Table 4 is a summary of the data validation that was conducted for each sampling and analysis event. The summary includes review of laboratory analysis receipt, qualifiers, laboratory method blanks, replicant sample results and matrix spike recovery. Additionally, a field duplicate was collected for each detection monitoring event and relative percentage difference calculated for the duplicate sample. Laboratory and field duplicate values were within the data validation limits.

The data quality assessment is that analysis was consistent with the CCR SAP for the site. Based on this review, the field and laboratory methods followed the procedures specified in the CCR SAP, the completeness target/goal of 100 percent was achieved, none of the data were rejected, and data were found to satisfy the data quality objectives to be included for statistical evaluation as presented in Section 4.

SECTION 4

Statistical Evaluation

This section summarizes the CCR regulatory requirements for statistical evaluation under the detection phase, as well as the selected statistical method, and compares the 2021 monitoring data to determine if monitoring values exceed compliance limits.

4.1 Statistical Evaluation Regulatory Requirements

The CCR Rule specifically lists four methods acceptable for statistical analysis (40 CFR 257.93[f]):

1. Parametric or nonparametric analysis of variance
2. Tolerance intervals
3. Prediction intervals (limits)
4. Control charts

Another statistical test method also may be considered if it meets the performance standards listed in 40 CFR 297.93(g). Per the CCR Rule, the selected statistical method was posted to the publicly available website by the October 17, 2017, deadline.

4.2 Statistical Evaluation Methods and Compliance Limits

Based on the site-specific groundwater conditions and results from an exploratory evaluation on the background data, the selected statistical method for evaluating groundwater detection monitoring data is a prediction interval (limit) method, which is a statistical method option, per 40 CFR 257.93(f)(3). The prediction interval method will be used separately for each well-constituent pair and was selected because the Appendix III constituents exhibited significant spatial variability, making an upgradient versus downgradient, also known as interwell, comparison infeasible. The method for six of the seven Appendix III constituents (including boron, calcium, chloride, pH, sulfate, and TDS) is an intra-well Prediction Limit; the seventh constituent, fluoride, is handled separately via the Double Quantification Rule (DQR). Per EPA *Unified Guidance* (2009), the DQR is applicable to constituents that exhibit 100 percent no-detect characteristics, and fluoride is 100 percent nondetect during the background period. The DQR method, which is applicable to fluoride only, assumes that a SSI is confirmed if both the original and retest values are confirmed to be detected values. Supplemental details and rationale for method selection are presented in *Coal Combustion Residual Statistical Method for the Limited Purpose Landfill at the Centralia Mine near Centralia, Washington* (CH2M, 2017b), which has been posted to the CCR public website prior to the October 17, 2017, deadline.

EPA's *Unified Guidance* (2009) recommends that prediction limits be combined with retesting for maintaining a low sitewide false positive rate (SWFPR) while providing high statistical power. The exploratory analysis confirmed a "1-of-2" retesting strategy is acceptable and will be used to verify an apparent SSI (that is, an initial SSI for Appendix III constituents). Retesting is an integral part of the statistical methodology for controlling the SWFPR when multiple monitoring locations and parameters are being evaluated. Assuming the "1-of-2" retesting approach, an apparent SSI cannot be confirmed or denied until the results of the resampling event have been obtained.

Following the prediction interval method, the compliance limits were calculated on the CCR Appendix III constituents for the three downgradient compliance wells (LPLF-2R, LPLF-8, and LPLF-7R). The calculation of intra-well prediction limits is used for six of the seven CCR constituents, including boron, calcium, chloride, pH, sulfate, and TDS; fluoride is evaluated separately via the DQR as a result of the 100 percent nondetects during background period. Assuming that sample background data are normally

distributed, or assuming that they can be transformed to fit a normal distribution, then the parametric upper prediction limit (UPL) is based on equation (1) as follows:

$$UPL = \overline{x} + Ks \quad (1)$$

where:

$\overline{x}$ is the sample mean,

s is the sample standard deviation, and

K is a multiplier factor that is chosen based on the evaluation schedule (nE), number of constituents (nc), number of wells (nw), number of background observations (n), overall SWFPR, and the specific retesting scheme selected.

For constituents such as pH, which require both lower and upper prediction limits, equation (2) is used:

$$LPL, UPL = \overline{x} \pm Ks \quad (2)$$

Table 5 presents the background (compliance) limits for each Appendix-III constituent derived from the equations above. For selected constituents exhibiting trends during background period, the background data were detrended before determining the background levels. As shown in Table 5, the constituents in which trends will be accounted for include boron, calcium, and TDS at well LPLF-2R; chloride, sulfate, and TDS at well LPLF-7R; and calcium, sulfate, and TDS at well LPLF-8. For the cases listed as 'no' for trend removal, the UPLs and lower prediction levels are the fixed compliance values to directly compare against future detection monitoring data to determine a SSI above compliance, and will be the levels to use until background is updated in the future. However, for cases listed as 'yes' for trend removal, the UPL is a calculated value dependent on time of sampling using equation (3) as follows:

Trend accounting UPL = Intercept + slope(time, in days) + residual value* (3)

Note that the trendline equations and variables for intercept, slope, time, and residual values are shown in Table 5; these UPLs are listed as 'calculated' as they are dependent upon the time when the compliance data were obtained. The time (in days) is assumed as the number of days starting from the initial background event (which was collected on November 14, 2017) to when the compliance data in question were collected (example May 19, 2021, which is 1647 days following the initial event on November 14, 2017). For TDS at well LPLF-2R, transformation was performed using the Tukey power transformation to convert it into a normal distribution before applying the simple regression to determine an appropriate relationship for trend removal.

4.3 Statistical Evaluation Results

Table 6 summarizes the monitoring results determined to be confirmed SSI after retesting and therefore identified for further evaluation. The 2021 groundwater monitoring results were less than or within the respective compliance limits, except for the following six cases, boron in LPLF-2R and LPLF-8, and total dissolved solids (TDS) in LPLF-2R.

Resampling and confirmation testing were conducted within 90 days after validation of monitoring results and evaluated for potential detection or applicability of an alternative source demonstration. Resampling confirmed the values for boron in LPLF-2R and LPLF-8 and TDS in LPLF-2R. Therefore, resulting in a total of six SSIs.

The remaining detections were determined that an alternative source demonstration was appropriate for the six results. Section 5 discusses the alternative source demonstration and applicability to these confirmed SSI results. It is anticipated that these results will be included in a review of site conditions and groundwater quality variability under changing groundwater elevations.

SECTION 5

Alternative Source Demonstration

This section presents an alternative source demonstration in response to the confirmed SSIs in accordance with 40 CFR Part 257.94(e)(2).

5.1 CCR Rule Regulatory Applicability

In accordance with 40 CFR Part 257.94(e)(2), the site owner has the option to demonstrate that a source other than the regulated unit (ash waste in the LPLF) caused the SSI exceeding background levels before automatically shifting into the assessment phase requirements. The CCR regulations cite examples of alternative sources causing SSIs (for example, error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality).

The CCR regulations require alternative source demonstrations to be completed within 90 days following determination of a valid SSI. The retesting results for the Spring and Fall events were validated for the four SSI and conditions were reviewed within the 90-day period to complete the alternative source demonstration (or the need to shift into assessment monitoring if a successful demonstration is not made). Both demonstrations are included in this section of the 2021 annual report for documentation purposes.

5.2 Alternative Source Demonstration

This section presents the technical basis and documentation to support that natural variation in groundwater quality is the reason for the SSIs observed in monitoring wells LPLF-2R and LPLF-8 as shown in Table 6 at the LPLF site. Additional evaluation was conducted looking at the time series for each of these wells and parameters and a statistical trend evaluation to aid in the demonstration evaluation.

5.2.1 Site History

The hydrogeological setting of the LPLF is unique in that present-day subsurface conditions were constructed such that surface overburden soils (mine spoils) were excavated during active mining operations in 2006 to expose coal seams within the relatively fine-grained Skookumchuck formation. As part of reclamation efforts following coal mining activities, the mine spoils were backfilled into a pit that includes the present-day footprint of the LPLF. Recharge via precipitation created a shallow zone of saturation within the mine spoils immediately overlying the fine-grained Skookumchuck formation, which is the target groundwater monitoring zone as described in the *Coal Combustion Residual Groundwater Monitoring System Certification for the Limited Purpose Landfill at the Centralia Mine Site near Centralia, Washington* (CH2M, 2017b). The mine spoils are generally characterized as light tan to brown silty loam to silty clay with sand lenses; the underlying Skookumchuck is characterized as a sequence of siltstones, claystones, coal seams, and occasional carbonaceous shales. The stratigraphic sequence beneath the center of the LPLF consists of approximately 80 feet of mine spoils, underlain by relatively thick sequence of fine-grained Skookumchuck, estimated at over 500 feet thick in the area.

The mine spoils were generated by removal of coal seam interburdens and placed back into the mined pit. The interburden comprised silt and claystones with stringers of sub-economical coal. The backfill placement resulted in a highly heterogeneous spoil of pulverized silt and claystone with discrete and localized coal and pyritic debris mixed laterally and vertically. These gravel to cobble sized materials can be acid forming and generate localized suppressed pH in the otherwise alkaline silt and clay spoils, and secondary mobilization of calcium, sulfate and other constituents, subsequently increasing TDS in groundwater. The primary mechanisms required for suppressed pH and changes in groundwater

chemistry are presence of acid forming material, water, and oxygen. Fluctuations in groundwater can influence these as fluctuations allow great oxygen access to moist, acid forming materials.

The presence of acid-forming materials in the spoils can result in elevated TDS and associated dissolved constituents in groundwater with localized increases closer to the material. As groundwater fluctuates, this can either submerge previously unsaturated material or expose saturated material to aerobic conditions in the unsaturated zone. The vertical heterogeneity of these materials results in groundwater conditions that can be highly variable for constituents susceptible to mobilization under suppressed pH conditions within localized areas, within a specific monitoring location.

Prior to the CCR regulations that were enacted in April 2015, TCM characterized the hydrogeological conditions for the LPLF as documented in Section 2 of TransAlta Centralia Mining LLC, Limited Purpose Landfill Solid Waste Permit Application, dated October 2008 (CH2M, 2008). To satisfy Chapter 173-350-500 (Limited Purpose Landfill) Washington Administrative Code (WAC) regulations, TCM initiated background monitoring prior to waste placement from 2007 to present, as described in the Washington State Department of Ecology (Ecology) and Lewis County Environmental Health District-approved Groundwater Monitoring Plan for TransAlta Centralia Mining LLC Limited Purpose Landfill, Amendment 1, July 2011 (CH2M, 2011a). Since 2010, TCM has prepared quarterly and annual groundwater monitoring reports and submitted these to Ecology in accordance with Chapter 173-350[5], Groundwater Monitoring – Data Analysis, Notification, and Reporting. To date, the WAC program remains under detection-phase monitoring status. The existing WAC data collected from 2007 to 2009 pre-date waste placement into the LPLF and were used to document the heterogenous nature of background conditions.

5.2.2 Background Monitoring Results

The background monitoring period may not have fully captured the actual natural variation that might be expected to occur in the spoils and under natural groundwater recharge and fluctuations, especially under conditions where groundwater elevations are lower or higher than have been previously observed. The natural groundwater environment can vary from changes in annual precipitation (recharge) and related geochemical changes associated with residence time within the aquifer materials. Background monitoring events conducted over several years or multiple hydrological cycles would better characterize the natural variability in groundwater and yield more data to strengthen statistical power of detection monitoring analyses. These conditions are the basis for the updated background evaluation conducted in 2019 and used in this evaluation (Jacobs, 2019).

Reviewing the site hydrographs in Figure 3 for both wells LPLF-2R and LPLF-8, groundwater elevations have decreased since the initial installation and monitoring. Figures 6 and 7 show the time series plots for TDS and boron for downgradient wells during this same time period. For the selected parameter and well parings, Boron and TDS for LPLF-2R and boron for LPLF-8, a Mann-Kendall trend test was applied looking for significant trends given a 95 percent confidence limit, similar to and for comparison with the background UPL that were developed which resulted in calculated UPL where a trend was detected.

The time series plots of TDS and boron in both wells suggests that the changes in groundwater elevation are establishing different background concentrations, with more recent monitoring results being more consistent over time that historic measurements collected with groundwater elevations were higher in these two locations.

In LPLF-2R boron has increased to a slightly lower and consistent concentration just above the UPL calculated using the initial, 8 months of background sampling. For TDS, it shows the value decreasing, but decreasing at a lower slope that was initially calculated for TDS in well LPLF-2R (both values are calculated values, using a decreasing slope for calculation of UPL values). These results support that the exceedances for boron and TDS in LPLF-2R is a result on continued change in saturated spoils geochemistry, and not associated with release from the landfill.

The exceedance for boron in well LPLF-8 is based on the UPL of 0.99 mg/L. The exceedances have been 1.03 mg/L and 1.01 mg/L for spring and fall, respectively. Figure 7 shows the time series for boron in the downgradient wells, and that LPLF-8 has always been historically much higher than the other downgradient wells, suggesting that there is an alternative source within the backfilled spoils for the boron in groundwater detected at this location. Boron concentration have increased, and using the full set of data, shows a statistically significant trend at 95 percent confidence level. The time series plot for pH is also shown in Figure 7 and shows that LPLF-8 has also always been historically lower than the other background wells, again indicative of an alternative source for acid forming material within the backfilled spoils near the LPLF-8 location.

Given that LPLF-8 has always exhibited higher concentrations of boron than other downgradient wells, while higher these concentrations are still relatively low, that the changes are within about 0.04 mg/L of change, and that groundwater at this location continues to fluctuate and is at historically low levels, demonstrates that the continued change in boron is due to the nature of the saturated backfill spoils as the alternative source for these results.

As noted in the statistical method certification (CH2M, 2017a) and in accordance with Unified Guidance (EPA, 2009), it is recommended to update background conditions following four to eight sampling events because of the complex behavior of groundwater and the need for sufficiently large sample sizes. Using this principle with semiannual sampling as prescribed under the CCR program, the background values should be reviewed and updated using statistical analysis every 2 to 4 years, assuming no confirmed statistically significant increase is identified. In addition, if hydrogeologic conditions change, then background should be updated to match the latest conditions. Based on this analysis, excluding the initial 8 months of sampling should be considered in future background UPL calculations.

5.3 Alternative Source Demonstration Results

Key findings as provided in this alternative source demonstration are summarized as follows:

- 2021 Monitoring and Retesting was conducted in compliance with the CCR program and resulted in confirmed SSI values based on the current CCR program statistical method.
- These values were evaluated and qualified as unrelated to the LPLF waste materials and related to natural variation in groundwater quality within the saturated backfilled spoils.
- These findings are consistent with similar demonstration for the CCR program in previous groundwater monitoring results at the site.
- The CCR program remains under the detection-phase monitoring status per 40 CFR 257.94, *Detection Monitoring Program.*

SECTION 6

Summary

Key findings developed and/or confirmed from the 2021 annual groundwater report are summarized as follows:

- The groundwater elevations measured during the compliance monitoring events were used to develop a site hydrograph, potentiometric surface, inferred groundwater flow direction, and calculated groundwater flow velocity for the spring and fall monitoring events in 2021.
- Groundwater flow directions, gradients, and flow velocities were consistent with historical measurements.
- Groundwater monitoring results for compliance constituents met the compliance limits except for two parameters, boron in monitoring well LPLF- 8 and boron and TDS in monitoring well LPLF-2R.
- The confirmed SSI's were evaluated and demonstrated to be a source other than the regulated unit (ash landfill) and remains in detection phase monitoring.
- Based on groundwater site conditions, the additional groundwater monitoring results will be reviewed and evaluated for the compliance limits using the selected statistical methodology.

SECTION 7

References

CH2M HILL Engineers, Inc. (CH2M). 2011b. *TransAlta Centralia Mining Fourth Quarter 2010 Groundwater Monitoring Report.*

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Tables

Table 1. Groundwater Monitoring Well Network

2021 Annual Groundwater Monitoring Report for Limited Purpose Landfill - TransAlta Centralia Mine LLC

Well	Installation Date	Coordinates in NAD27[1]		Top of Casing Elevation[2]	Reference Point Top of Ground Elevation[2]	Well Screen Elevation[2]		Sand Pack Elevation[2]		Well Depth[3]	Aquifer Unit	Hydraulic Designation
		Northing	Easting			Top	Bottom	Top	Bottom			
LPLF-1	October 2007	520,881.45	1,420,272.06	347.80	344.58	305.58	285.58	309.58	282.58	59	Mine Spoils	Up or Cross-Gradient
LPLF-5	August 2008	521,931.70	1,419,921.73	359.90	357.88	349.88	344.88	351.38	343.38	13	Mine Spoils	Upgradient
LPLF-8	August 2008	521,235.37	1,419,233.53	298.75	296.93	279.93	274.93	282.93	273.93	22	Mine Spoils	Downgradient
LPLF-2R	July 2016	521,561.20	1,419,130.52	296.04	293.86	10.0	263.9	275.86	262.36	31	Mine Spoils	Downgradient
LPLF-7R	July 2016	521,180.82	1,419,531.95	299.00	297.04	279.7	269.7	282.04	269.04	28	Mine Spoils	Downgradient

General Notes:

1. Well LPLF-1 is low yield and sampled via bailer.

Column Header Footnotes:

[1]Washington State Plane Coordinates (NAD27).

[2]All elevations in feet above mean sea level (NGVD29).

[3]Well depth is feet below ground surface (rounded to nearest foot).

Table 2. Groundwater Elevations and Field Parameters

2021 Annual Groundwater Monitoring Report for Limited Purpose Landfill - TransAlta Centralia Mine LLC

Well	Date Sampled	Reference Point Elevation (ft)	Depth to Water (ft btc)	Groundwater Elevation (ft)	Temp (°C)	pH	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Hydraulic Designation	Hydrostratigraphic Unit	Comments
LPLF-1	5/19/21	347.80	58.45	289.35	12.2	7.4	2.00	41	3,808	--	Up or Cross Gradient	Backfill/Mine Spoils	Sampled via bailer - slow recharge
LPLF-1	10/19/21	347.80	58.70	289.10	12.4	6.7	2.00	40	3,561	--	Up or Cross Gradient	Backfill/Mine Spoils	Sampled via bailer - slow recharge
LPLF-5	5/19/21	359.90	NA	--	--	--	--	--	--	--	Upgradient	Backfill/Mine Spoils	Dry/no water in well. Not sampled.
LPLF-5	10/19/21	359.90	15.85	344.05	--	--	--	--	--	--	Upgradient	Backfill/Mine Spoils	Insufficient water. Not sampled.
LPLF-8	5/19/21	298.75	11.07	287.68	11.4	6.6	2.10	1	3,931	--	Downgradient	Backfill/Mine Spoils	--
LPLF-8	6/21/21	298.75	11.62	287.13	14.3	5.7	1.44	42	7,717	--	Downgradient	Backfill/Mine Spoils	--
LPLF-8	10/19/21	298.75	13.80	284.95	12.7	5.9	3.45	13	1,100	--	Downgradient	Backfill/Mine Spoils	--
LPLF-8	12/1/21	298.75	11.79	286.96	12.8	6.1	1.08	25	1,300	--	Downgradient	Backfill/Mine Spoils	--
LPLF-2R	5/19/21	296.04	3.46	292.58	11.9	7.0	1.06	24	3,875	--	Downgradient	Backfill/Mine Spoils	--
LPLF-2R	6/21/21	296.04	3.82	292.22	15.0	6.1	3.61	52	7,618	--	Downgradient	Backfill/Mine Spoils	--
LPLF-2R	10/19/21	296.04	5.37	290.67	12.9	6.4	0.87	45	3,741	--	Downgradient	Backfill/Mine Spoils	--
LPLF-2R	12/1/21	296.04	3.96	292.08	12.1	6.4	0.90	29	3,698	--	Downgradient	Backfill/Mine Spoils	--
LPLF-7R	5/19/21	299.00	20.03	278.97	10.5	7.0	1.72	47	3,134	--	Downgradient	Backfill/Mine Spoils	--
LPLF-7R	10/19/21	299.00	21.64	277.36	12.2	6.4	1.48	94	2,918	--	Downgradient	Backfill/Mine Spoils	--
Water Levels Only													
LPLF-2	5/19/21	302.26	11.33	290.93	--	--	--	--	--	--	Cross-Gradient	Backfill/Mine Spoils	--
LPLF-2	10/19/21	302.26	14.57	287.69	--	--	--	--	--	--	Cross-Gradient	Backfill/Mine Spoils	--
LPLF-3	5/19/21	295.64	5.92	289.72	--	--	--	--	--	--	Cross-Gradient	Backfill/Mine Spoils	--
LPLF-3	10/19/21	295.64	9.60	286.04	--	--	--	--	--	--	Cross-Gradient	Backfill/Mine Spoils	--
LPLF-4	5/19/21	303.12	3.53	299.59	--	--	--	--	--	--	Cross-Gradient	Backfill/Mine Spoils	--
LPLF-4	10/19/21	303.12	8.62	294.50	--	--	--	--	--	--	Cross-Gradient	Backfill/Mine Spoils	--

Notes:

" -- " = Not applicable, not available, and/or not measured.

Reference point elevation is top of PVC casing; all elevations are in feet above mean sea level (NAVD88).

Field parameter readings represent final stabilized readings obtained during low-flow purge immediately prior to collection of water-quality sample.

ft = feet

ft btc = feet below top of casing

C = degrees celcius

mg/L = milligrams per liter

mV = millivolts

uS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Units

Table 3. Groundwater Analytical Summary

2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC

Well			**LPLF-1**	**LPLF-2R**	**LPLF-7R**	**LPLF-8**	**LPLF-8 (FD)**	**LPLF-2R**	**LPLF-8**	**LPLF-1**	**LPLF-2R**	**LPLF-7R**	**LPLF-8**	**LPLF-7R (FD)**	**LPLF 2R**	**LPLF 8**
Sample ID			051921-CCR-LPLF1	051921-CCR-LPLF2R	05192021-CCR-LPLF7R	051921-LPLF-8	051921-LPLF-8FD	062121-LPLF-8	062121-LPLF-8	101920-LPLF-1	101921-LPLF 2R	101921-LPLF-7R	101921-LPLF-8	101921-LPLF-7RFD	120121-CCR-LPLF2R	120121-CCR-LPLF-8
Sample Date			5/19/2021	5/19/2021	5/19/2021	5/19/2021	5/19/2021	6/21/2021	6/21/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021	12/1/2021	12/1/2021
Hydraulic Designation			Up or Cross Gradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Up or Cross Gradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Analyte	**Method**	**Units**														
Boron	EPA 6010C	mg/L	0.596	0.377	0.375	1.11	1.1	0.349	1.03	0.601	0.366	0.353	1.24	0.338	0.346	1.01
Calcium	EPA 6010C	mg/L	250	477	223	398	407	-	-	241	507	233	416	226	-	-
Chloride	EPA 9056A	mg/L	3.02	7.76	8.64	6.96	6.92	-	-	3.14	6.75	8.46	6.75	8.47	-	-
Fluoride	EPA 9056A	mg/L	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	-	-	1 U	1 U	1 U	1 U	1 U	-	-
pH	SM 4500H B	unit	7.4 F	7.0 F	7.0 F	6.6 F	-	6.14 F	5.73 F	6.7 F	6.4 F	6.4 F	5.9 F	-	6.4 F	6.1 F
Sulfate	EPA 9056A	mg/L	2,610	1,580	1,200	2,250	2,210	-	-	2,350	1,730	1,870	3,440	1,600	-	-
Total Dissolved Solids	SM 2540C	mg/L	3,040	3,350	2,490	3,710	3,710	3,380	-	2,950	3,500	2,490	3,680	2,490	3,450	-

Notes:

Field parameters represent final stabilized readings obtained during sampling immediately prior to sample collection.

Non-detect values reported as "U" with the laboratory method detection limit; "J" is estimated value as determined from data validation. F is for field measurement.

(H) for outside holding time for sample

(MS) for matrix spike recovery outside range

(FD) Field Duplicate outside relative percentage difference

Acronyms:

Data qualifiers: U = non-detect value, J = estimated value.

C = degrees celcius

mg/L = milligrams per liter

mV = millivolts

uS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Units

Table 4 Data Validation Summary

2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC

Validation Summary 5/19/2021

No discrepancies noted in sample receipt or in analysis.
No qualifiers noted in the analysis results
Method blank was non-detect
Replicant samples within RPD limits
Matrix Spike recovery values were within recovery limits
Field Duplicate for LPLF-8, FD RPD within limits

		5/19/2021		
Parameter	FD RPD Limit	LPLF-8	FD	FD RPD
TDS	20	3710	3710	0.0%
Chloride	20	6.96	6.92	-0.6%
Sulfate	20	2250	2210	-1.8%
Boron	20	1.11	1.1	-0.9%
Calcium	20	398	407	2.2%

Validation Summary 6/21/2021

No data qualifiers noted in the analysis results
Method blank was non-detect
Matrix Spike recovery within the % recovery limits

Validation Summary 10/19/2021

No discrepancies noted in sample receipt or in analysis.
No qualifiers noted in the analysis results
Method blank was non-detect
Replicant samples within RPD limits
Matrix Spike recovery values were within recovery limits
Field Duplicate for LPLF-7R, FD RPD within limits

		10/19/2021			
Parameter	FD RPD Limit	LPLF-7R	FD	FD RPD	
TDS	20	2490	2490	0.0%	
Chloride	20	8.46	8.47	0.1%	Method reporting limit on FD was significantly higher
Sulfate	20	1870	1600	-15.6%	
Boron	20	0.353	0.338	-4.3%	
Calcium	20	233	226	-3.1%	

Validation Summary 12/1/2021

No data qualifiers noted in the analysis results
Method blank was non-detect
Matrix Spike recovery within the % recovery limits

Table 5 Statistical Method for TransAlta Limited Purpose Landfill

2021 Annual Report for the Limited Purpose Landfill at the TransAlta Centralia Mine LLC *Updated 2019*

Well	Constituent	Units	Method	Trending Calculated UPL (if needed) = { Intercept + [Slope* Time(days)] + Residual } Trend Removal	Intercept	Slope	Residual	K-Value	Lower Prediction Levels (LPL)	Upper Prediction Levels (UPL)	Calculated Upper Prediction Limits (compliance values) 5/19/2021	6/21/2021	10/19/2021	12/1/2021
LPLF-2R	Boron	mg/L	Parametric UPL	Yes	0.35	-2.21E-05	0.0297	2.4	--	Calculated	0.343	0.343	0.340	0.339
LPLF-2R	Calcium	mg/L	Parametric UPL	Yes	--	--	--	2.4	--	545	--	--	--	--
LPLF-2R	Chloride	mg/L	Parametric UPL	No	--	--	--	2.4	--	9.59	--	--	--	--
LPLF-2R	Fluoride	mg/L	DQR	No	--	--	--	--	--	DQR	--	--	--	--
LPLF-2R	pH	pH units	Parametric UPL	No	--	--	--	2.79	5.98	7.07	--	--	--	--
LPLF-2R	Sulfate	mg/L	Parametric UPL	No	--	--	--	2.4	--	2163	--	--	--	--
LPLF-2R	TDS	mg/L	Non-Parametric UPL	Yes	3631	-0.359	201	2.4	--	Calculated	3241	3229	3186	3170
LPLF-7R	Boron	mg/L	Parametric UPL	No	--	--	--	2.4	--	0.421	--	--	--	--
LPLF-7R	Calcium	mg/L	Parametric UPL	No	--	--	--	2.4	--	263	--	--	--	--
LPLF-7R	Chloride	mg/L	Parametric UPL	No	--	--	--	2.4	--	9.99	--	--	--	--
LPLF-7R	Fluoride	mg/L	DQR	No	--	--	--	--	--	DQR	--	--	--	--
LPLF-7R	pH	pH units	Parametric UPL	No	--	--	--	2.79	6.09	6.99	--	--	--	--
LPLF-7R	Sulfate	mg/L	Parametric UPL	Yes	944	0.758	509	2.4	--	Calculated	2701	2726	2817	2849
LPLF-7R	TDS	mg/L	Parametric UPL	Yes	1890	0.892	607	2.4	--	Calculated	3965	3995	4102	4140
LPLF-8	Boron	mg/L	Parametric UPL	No	--	--	--	2.4	--	0.99	--	--	--	--
LPLF-8	Calcium	mg/L	Parametric UPL	Yes	--	--	--	2.4	--	441	--	--	--	--
LPLF-8	Chloride	mg/L	Parametric UPL	No	--	--	--	2.4	--	7.84	--	--	--	--
LPLF-8	Fluoride	mg/L	DQR	No	--	--	--	--	--	DQR	--	--	--	--
LPLF-8	pH	pH units	Parametric UPL	No	--	--	--	2.79	5.66	6.36	--	--	--	--
LPLF-8	Sulfate	mg/L	Parametric UPL	Yes	2124	1.14	357	2.4	--	Calculated	4359	4397	4533	4583
LPLF-8	TDS	mg/L	Parametric UPL	Yes	3429	0.49	445	2.4	--	Calculated	4682	4698	4757	4778

TIME (days) is the period from Nov. 14, 2016 to time of compliance event.

start date	days since start			
11/14/2016	1647	1680	1800	1843

Table 6 Summary of Compliance Value Exceedance

2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC

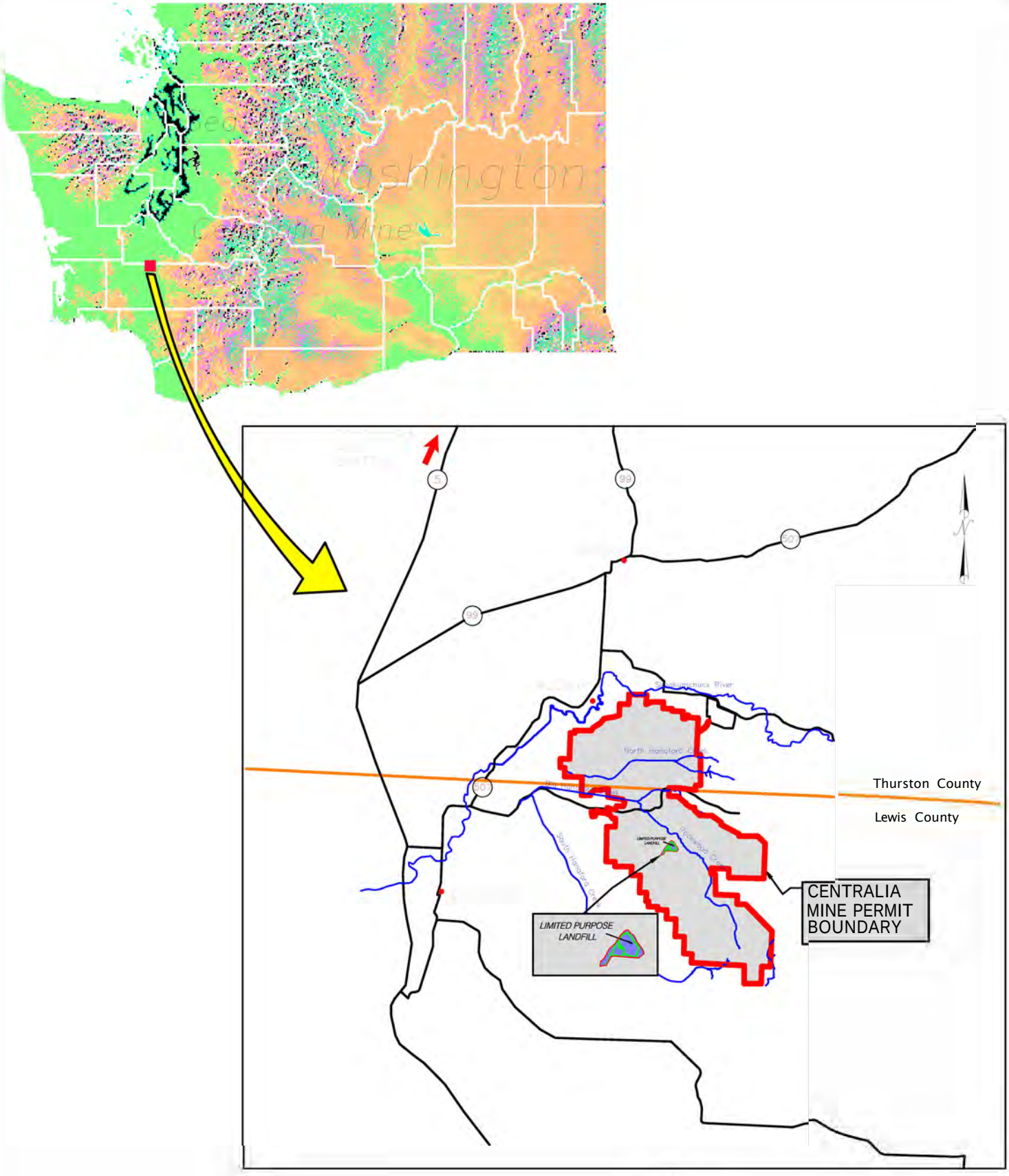
Well	Sample Date	Parameter	Upper Limit (mg/L)	Sample Result (mg/L)	Resample Date	Upper Limit (mg/L)	ReTest Result (mg/L)	Percent Over UL for Compliance Event	Percent Over UL for the Retesting Event	Percent Change between Compliance and Retesting Event
LPLF-2R	5/19/2021	**Boron**	**0.34**	0.38	6/21/2021	**0.34**	0.35	12%	1.7%	-8.2%
LPLF-2R	5/19/2021	**TDS**	**3,241**	3,350	6/21/2021	**3,229**	3,380	3%	4.7%	0.9%
LPLF-8	5/19/2021	Boron	0.99	1.11	6/21/2021	0.99	1.03	12%	4.0%	-7.2%
LPLF-2R	10/19/2021	**Boron**	**0.34**	0.37	12/1/2021	**0.339**	0.346	9%	2.1%	-6.5%
LPLF-2R	10/19/2021	**TDS**	**3186**	3500	12/1/2021	**3,170**	3,450	10%	8.8%	-1.4%
LPLF-8	10/19/2021	Boron	0.99	1.24	12/1/2021	0.99	1.01	25%	2.0%	-18.5%

Notes:

Bold parameters indicate calculated limits

Four results (highlighted yellow) were confirmed as statistically-significant exceedances for evaluation.

Figures



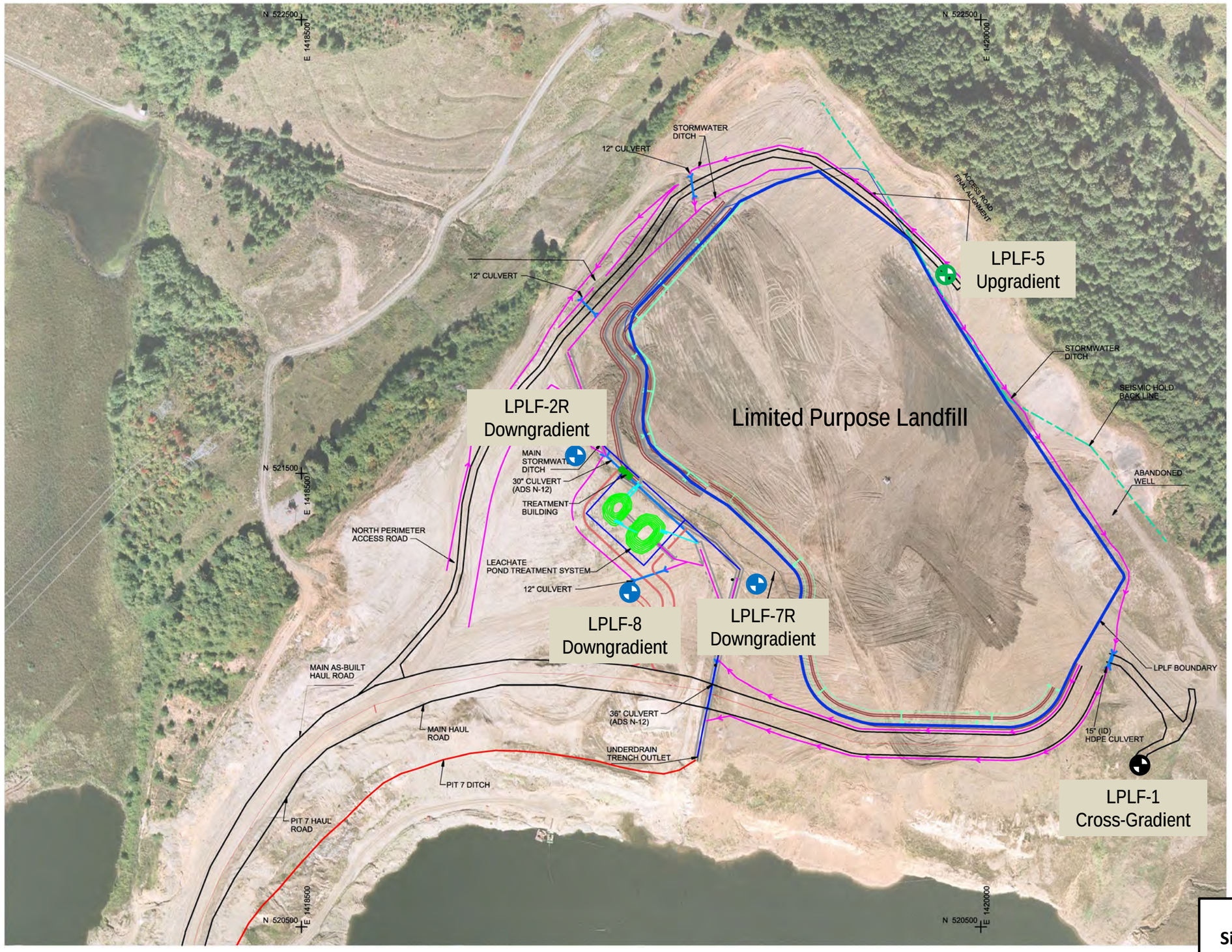
Source: TransAlta Centralia Mining LLC

Figure 1

Vicinity Map

2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC

Jacobs



N

LEGEND

- FINAL ROADS
- PIT 7 DITCH
- STORMWATER DITCH
- LPLF FOOTPRINT
- SEISMIC HOLD BACK LINE
- UPGRADIENT MONITORING WELL
- CROSS-GRADIENT MONITORING WELL
- DOWNGRADIENT MONITORING WELL

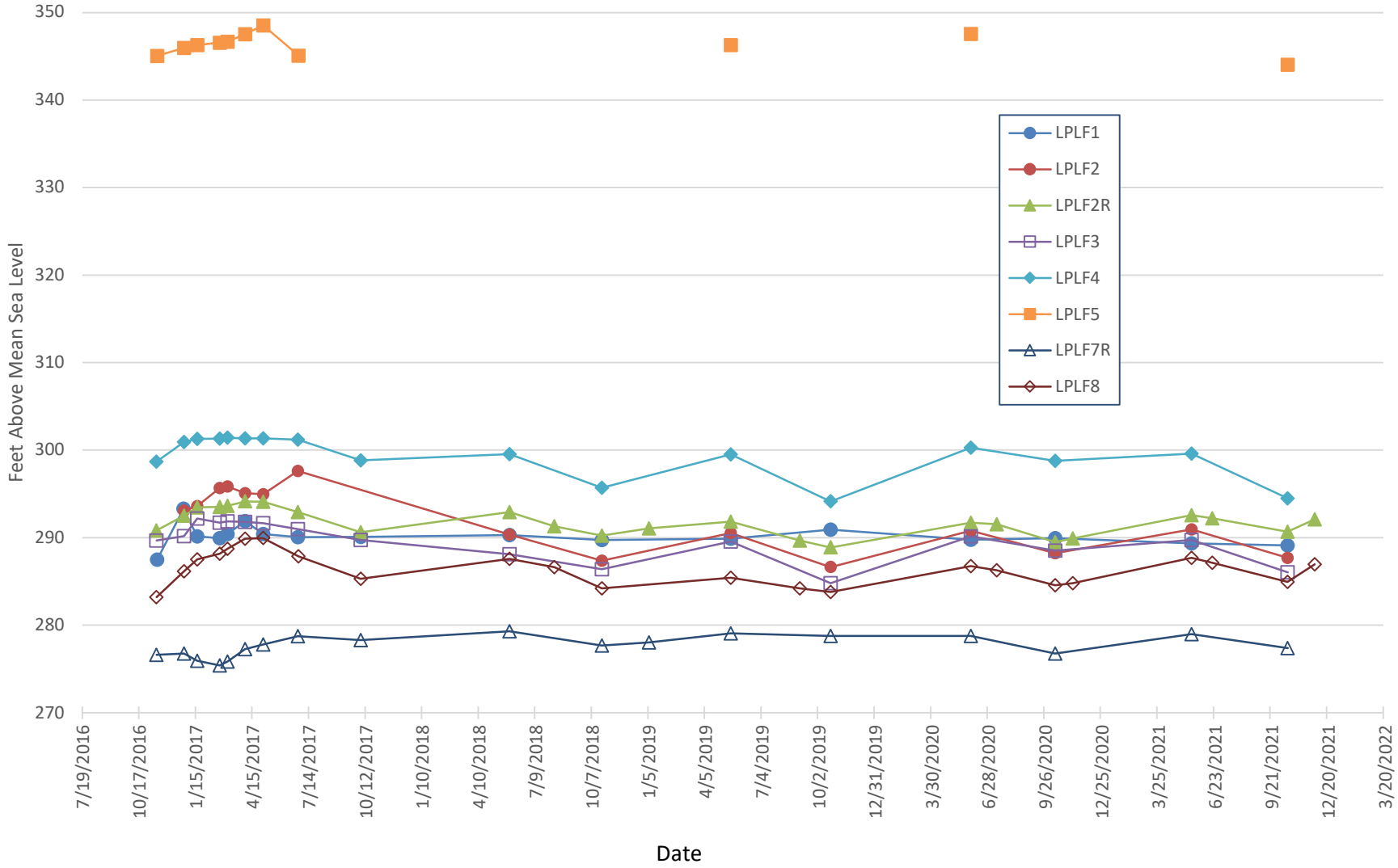
Source: TransAlta Centralia Mining LLC

0 250 500

Scale: feet

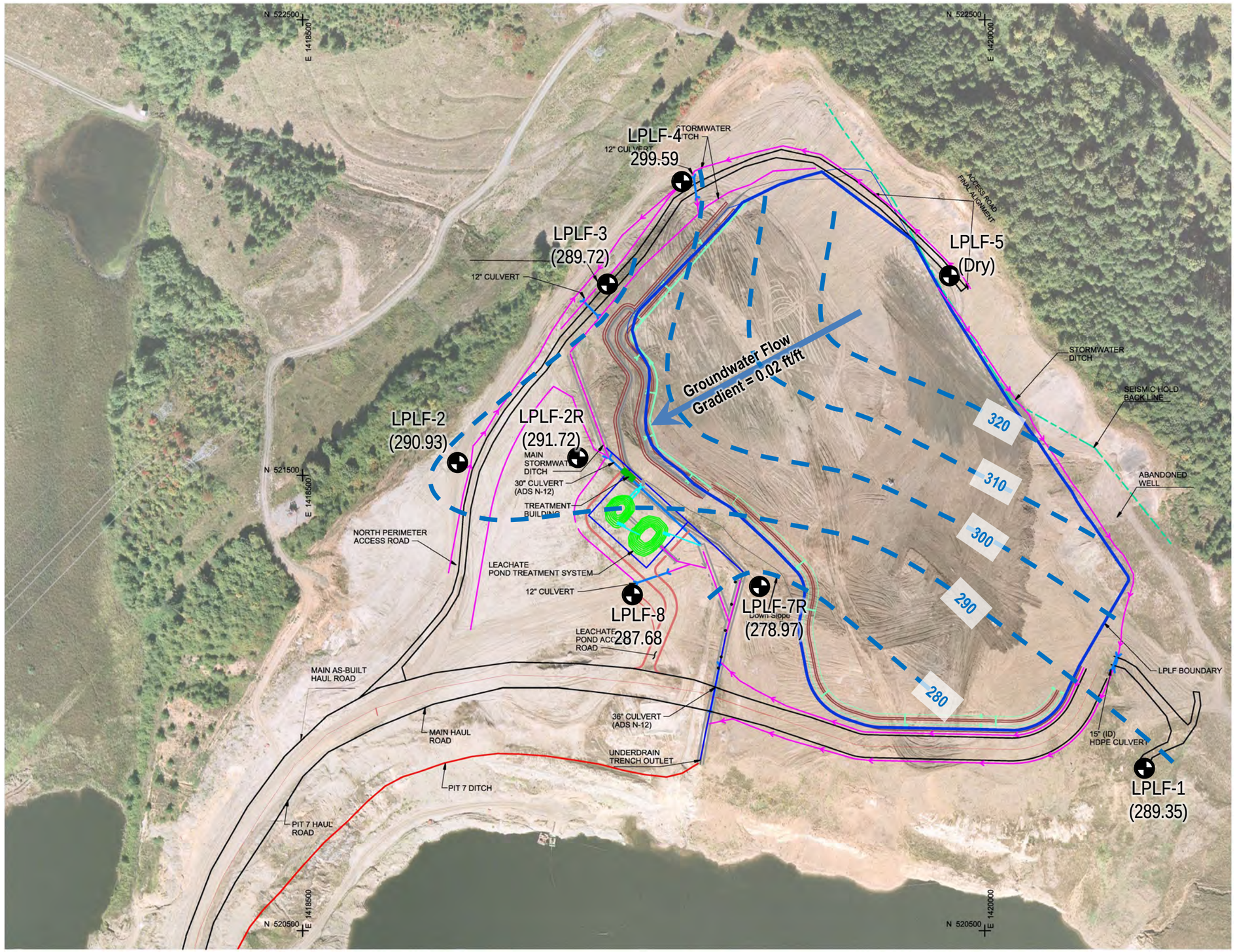
Jacobs

Figure 2
Site Map and Groundwater Monitoring Network
2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC



Jacobs

Figure 3. Groundwater Elevation Hydrograph
2021 Annual Report for Limited Purpose Landfill
January 2022



FINAL ROADS

PIT 7 DITCH

STORMWATER DITCH

LPLF FOOTPRINT

SEISMIC HOLDBACK LINE

LPLF-1 (289.86) GROUNDWATER WELLS AND ELEVATIONS (ft msl)

340 GROUNDWATER ELEVATION CONTOURS (ft msl)

INFERRED GROUNDWATER FLOW DIRECTION

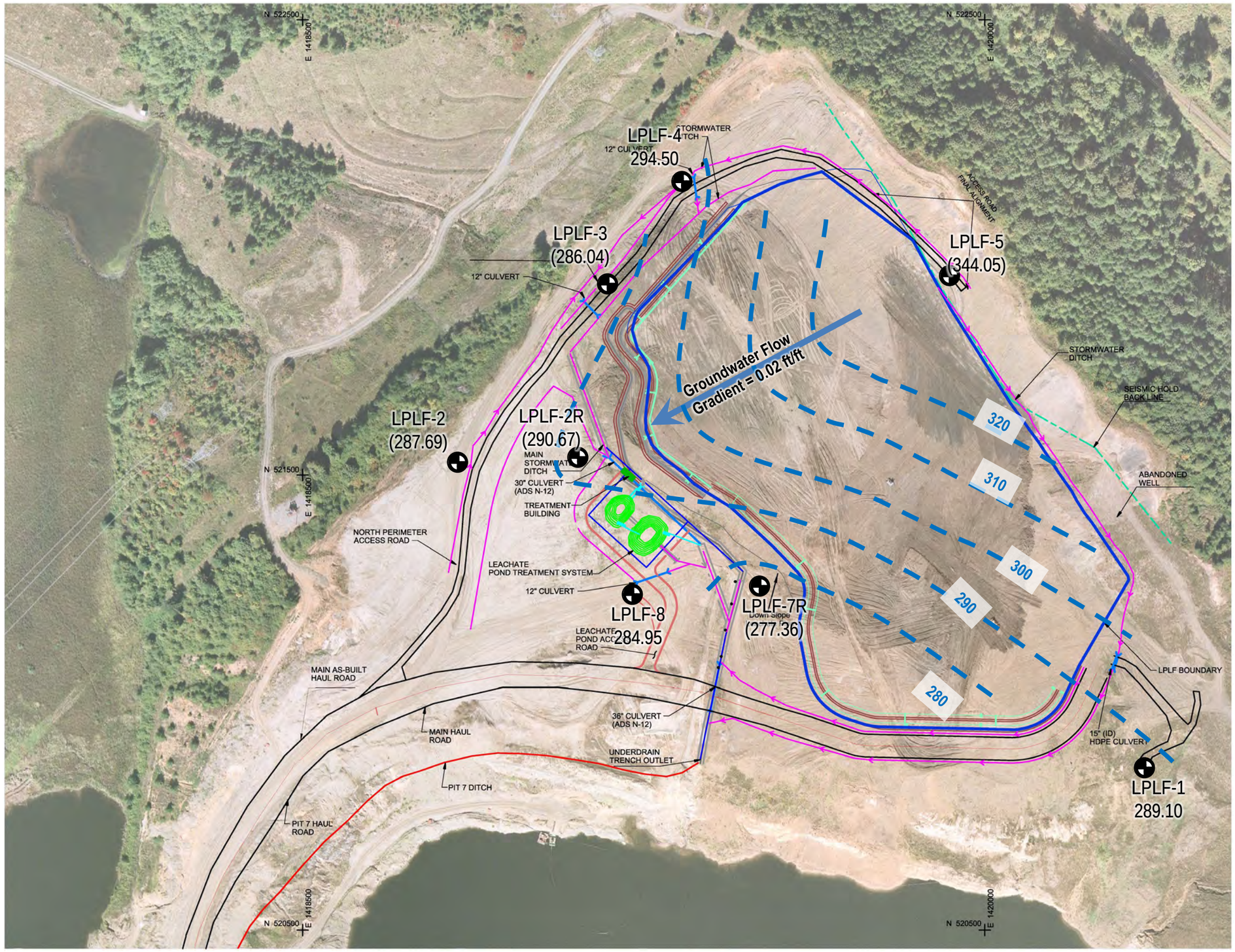
NOTE:
1. Groundwater levels measured June 2, 2020.

Jacobs

0 250 500

Scale: feet

Figure 4
Groundwater Elevations and Flow Map
May 19, 2021
2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC



Jacobs

0 250 500

Scale: feet

N

FINAL ROADS

PIT 7 DITCH

STORMWATER DITCH

LPLF FOOTPRINT

SEISMIC HOLDBACK LINE

LPLF-1 (289.86) GROUNDWATER WELLS AND ELEVATIONS (ft msl)

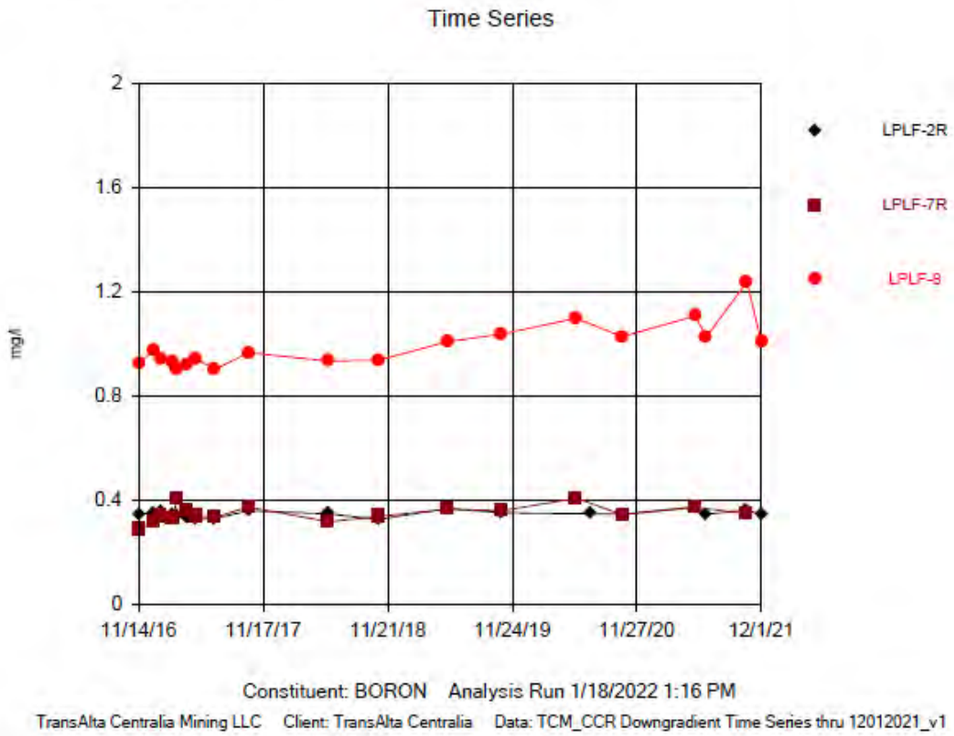
340 GROUNDWATER ELEVATION CONTOURS (ft msl)

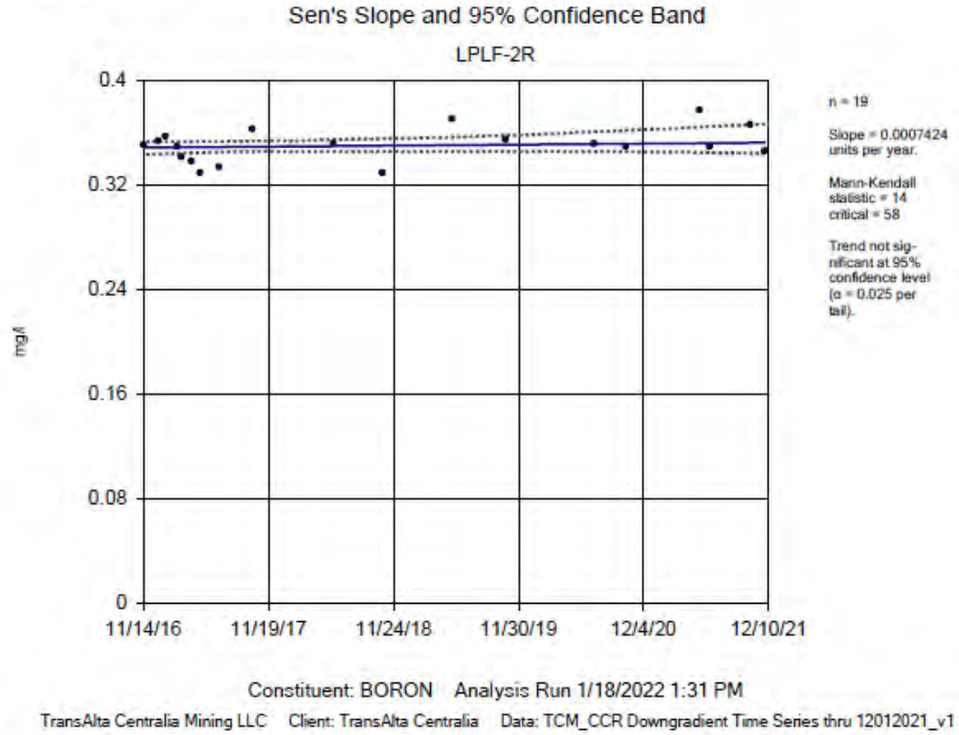
INFERRED GROUNDWATER FLOW DIRECTION

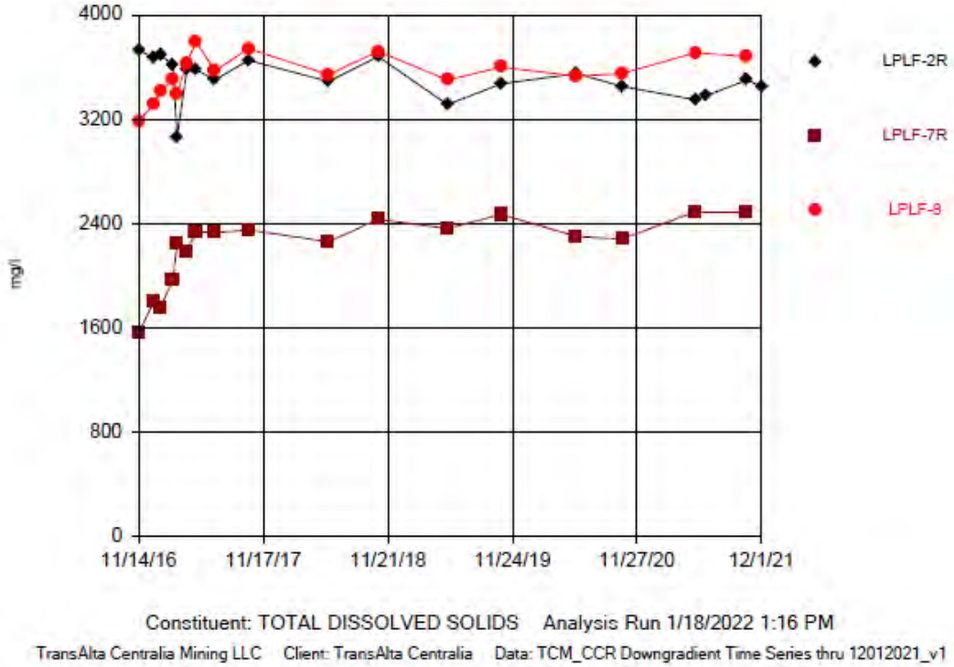
NOTE:

1. Groundwater levels measured June 2, 2020.

Figure 5
Groundwater Elevations and Flow Map
October 19, 2021
2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC







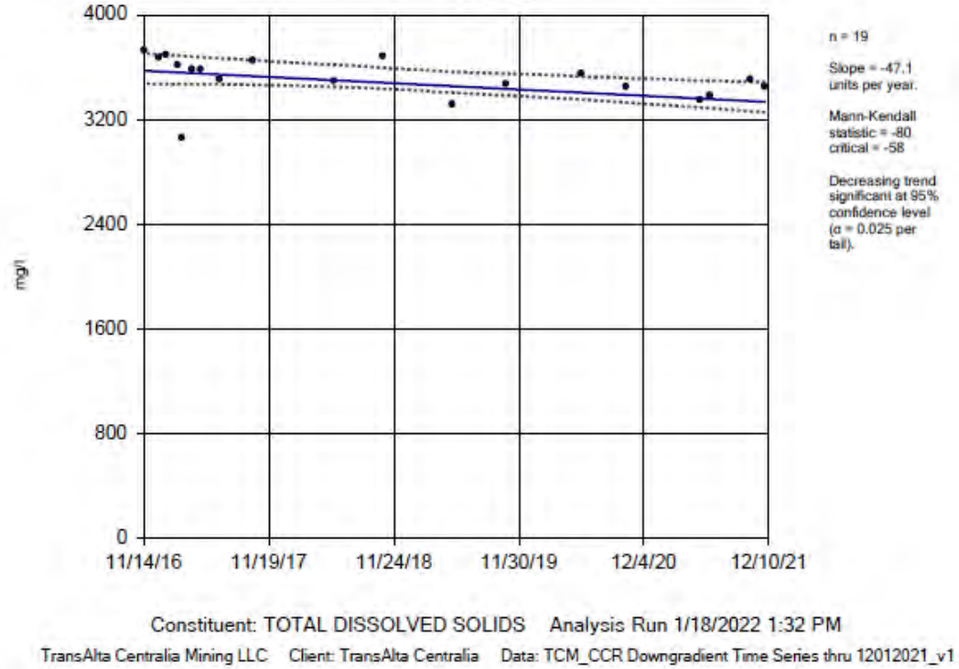
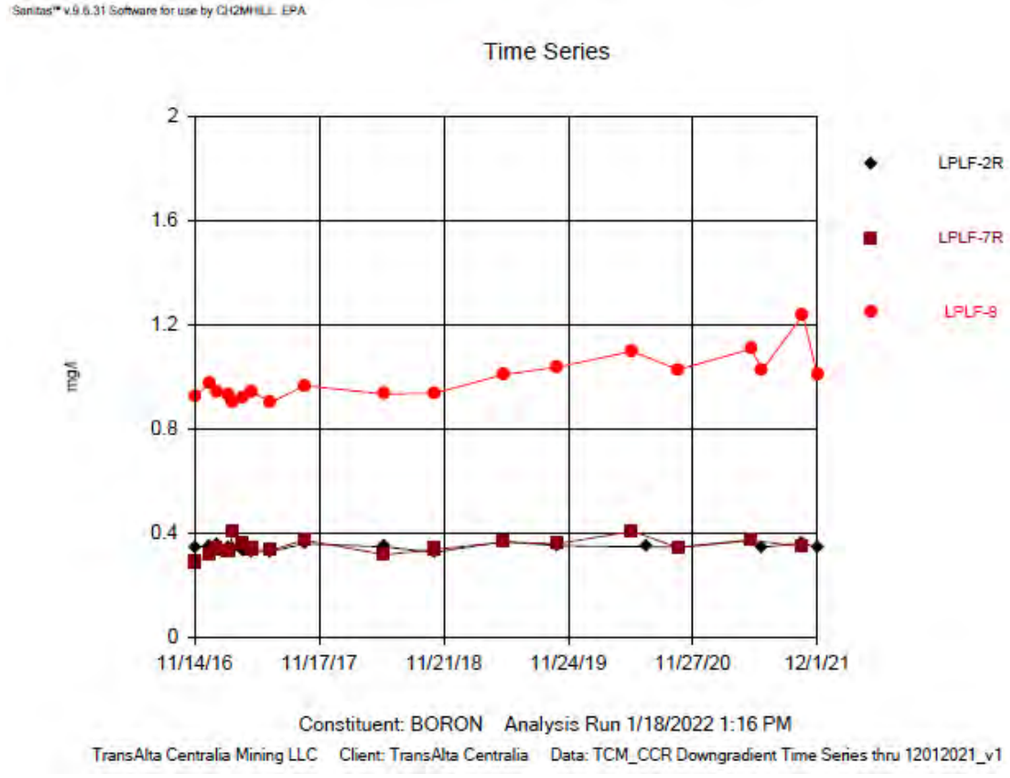
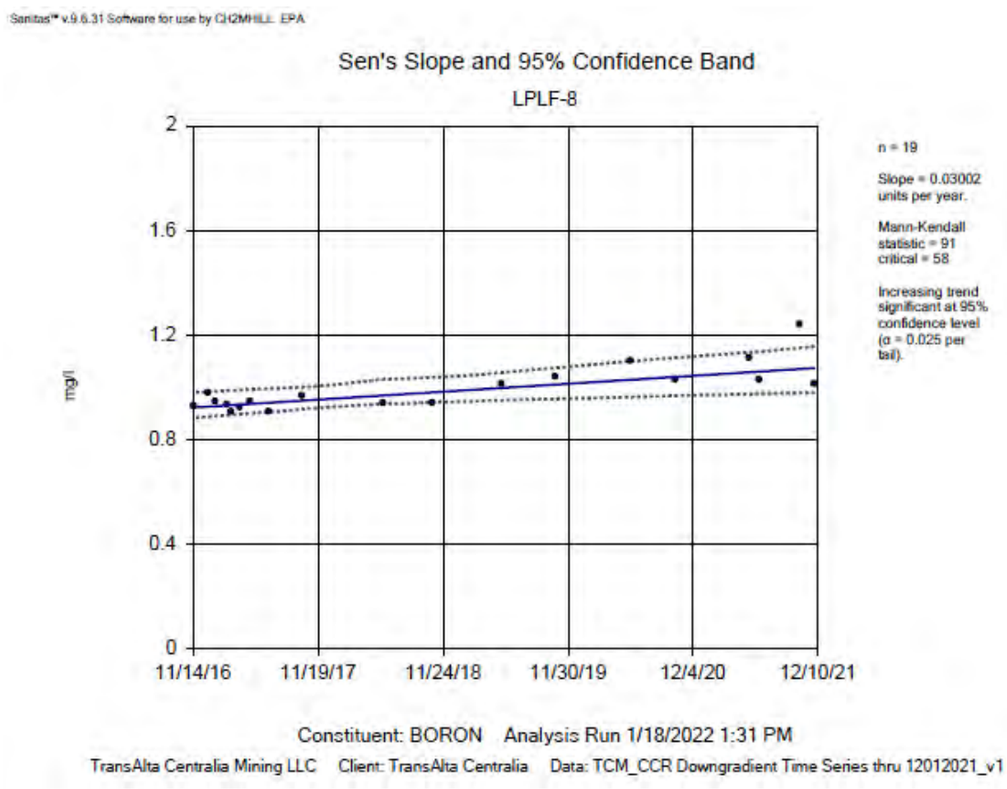


Figure 6
LPLF-2R Demonstration Time Series and Trend
2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC





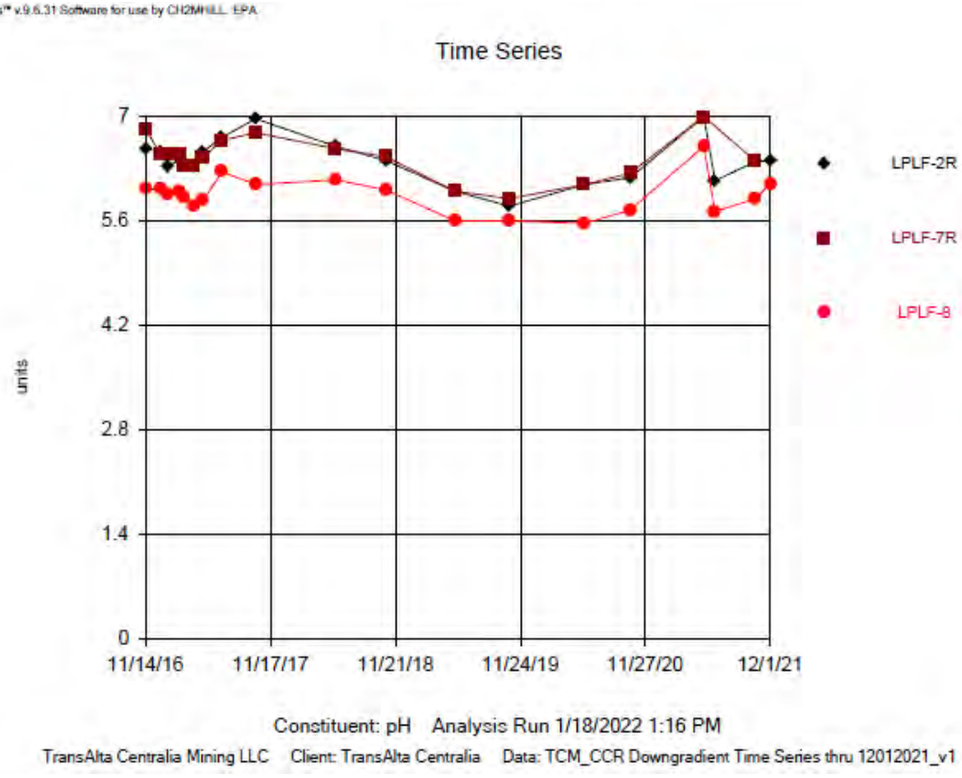


Figure 7
LPLF-8 Demonstration Time Series and Trend
2021 Annual Groundwater Monitoring Report for the Limited Purpose Landfill - TransAlta Centralia Mine LLC

Appendix A
Field Forms

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF1

Field Team: SM Date: 5/19/21

Weather/Temp: Cloudy, cool, 40° Arrival Time to Well: 735

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 58.45

Pump Setting [5]: Bailer Notes: 2 bails to purge, 1 for sample

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
745	59.12	1500	~~7.38~~ ~~7.38~~	3808	2.0	12.2	40.8		Reddish color murky
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method
[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO
[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** 745

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)
☐ Appendix IV (total metals, Radium 226, and Radium 228).
☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF 7R

Field Team: sm Date: 5/19/21

Weather/Temp: Cloudy, cool, 40° Arrival Time to Well: 8.00

Purge Method: ☐ Bladder ☑ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 20.03

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
809	*Begin Pumping*								
814	20.41	200	7.37	3182	2.70	10.0	53.0	-	clear
819	20.54	600	7.07	3143	2.13	10.5	51.3		clear
824	20.58	1000	7.01	3134	1.72	10.5	47.0		clear
	20.77								
	20.91								
	21.08								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** ~~824~~ 824

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☒ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : LPLF 7RMS 8:32 QC Sample Time: _____

Comments: LPLF 7RMSD 8:38

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF 8

Field Team: SM Date: 5/19/21

Weather/Temp: Cloudy, cool Arrival Time to Well: 851

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 11.07

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
855	*Begin Pumping*								
900	11.51	400	6.64	3945	3.10	11.3	9.3		clear
905	11.94	900	6.56	3931	2.10	11.4	0.6		Clear
	12.31								
	12.40								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** 905

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☒ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : LPLF 8 FD 9:10 QC Sample Time: _____

Comments: _____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF 2R

Field Team: SM Date: 5/19/21

Weather/Temp: P Cloudy, cool Arrival Time to Well: 925

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 3.46

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
939	*Begin Pumping*								
944	3.71	500	6.94	3992	1.81	11.9	22.5		
949	3.75	1000	6.95	3906	1.27	11.8	26.9		
954	3.81	1450	6.96	3875	1.06	11.9	24.4		
	3.78								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** 954

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF 5

Field Team: SM Date: 5/19/21

Weather/Temp: Cloudy, cool Arrival Time to Well: 1010

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** dry 15.94

Pump Setting [5]: _____ Notes: Dry - No sample.

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
1012	*Begin Pumping*								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** _____

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF4

Field Team: SM Date: 5/19/21

Weather/Temp: Cloudy Arrival Time to Well: 1016

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 3.53

Pump Setting [5]: _____ Notes: Water level only

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** _____

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: Tcm Project Number: CCR **Well ID:** LPLF 3

Field Team: SM Date: 5/19/21

Weather/Temp: Cloudy Arrival Time to Well: 1021

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 5.92

Pump Setting [5]: _____ Notes: water level only

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** _____

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF2

Field Team: SM Date: 5/19/21

Weather/Temp: Cloudy, Sprinkles Arrival Time to Well: 1026

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 11.33

Pump Setting [5]: _____ Notes: Water level only

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** _____

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF2R

Field Team: SM Date: 6/21/21

Weather/Temp: Sunny, 65°, warm Arrival Time to Well: 800

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 3.82

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (gal)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
805	*Begin Pumping*								
810	4.05	450	6.25	7577	2.88	15.3	59.6	-	Clear
815	4.16	950	6.15	7621	3.73	14.9	54.5	-	Clear
820	4.22	1400	6.14	7618	3.61	15.0	52.2	-	Clear
	4.16								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method
[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO
[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 062121-CCR-LPLF 2R **Sample Time:** 820

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)
☐ Appendix IV (total metals, Radium 226, and Radium 228).
☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF8

Field Team: SM Date: 6/21/21

Weather/Temp: Sunny, warm 70° Arrival Time to Well: 840

Purge Method: ☐ Bladder ☑ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 11.62

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (gal)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
842	*Begin Pumping*								
847	11.97	400	5.81	7739	1.80	15.1	49.7	-	Clear
852	12.39	900	5.75	7774	1.34	14.7	44.9	-	clear
857	12.68	1400	5.73	7717	1.44	14.3	41.8	-	Clear
	12.93								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method
[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO
[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 062121-CCR-LPLF8 **Sample Time:** 8:57

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)
☐ Appendix IV (total metals, Radium 226, and Radium 228).
☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

Groundwater Purging and Sampling Form

SITE: Project Number: CCR **Well ID:** LPLF1

Field Team: SM & KM Date: 10/19/21

Weather/Temp: Foggy, Cool Arrival Time to Well: 10:10

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: **Initial DTW (ft btc):** 58.70'

Pump Setting [5]: Notes: 2 bales to purge, 1 for sample.

Field Parameters									
Time [1]	DTW [2]	Purge Vol. ~~(gal)~~ mL	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
1020	59.14	1500	6.72	35.61	2.00	12.4	39.6		reddish/ murky color
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 101921-CCR-LPLF1 **Sample Time:** 10:20

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: Project Number: CCR **Well ID:** LPLF2

Field Team: SM & KM Date: 10/19/21

Weather/Temp: Foggy / cool & Dry Arrival Time to Well: 10:50

Purge Method: ☐ Bladder ☑ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 14.57'

Pump Setting [5]: _____ Notes: water level only

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (gal)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** _____

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: Project Number: CCR **Well ID:** LPLF2R

Field Team: SM & KM Date: 10/19/21

Weather/Temp: Foggy / Cool dry Arrival Time to Well: 10:56

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: **Initial DTW (ft btc):** 5.37 1

Pump Setting [5]: 150 ml / min Notes:

Field Parameters									
Time [1]	DTW [2]	Purge Vol. ~~(gal)~~ ml	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
1100	*Begin Pumping*								
1105	5.47	600	6.40	3727	1.67	13.0	46.5		~~muddy~~ clear
1110	5.51	950	6.39	3736	1.20	13.1	48.9		clear
1115	5.57	1400	6.38	3741	0.87	12.9	45.0		clear
	5.66								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 101921-CCR-LPLF2R **Sample Time:** 11:15

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify

QC SAMPLE : ☐ Field Duplicate ☒ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL):

QC Sample ID : 101921-CCR-LPLF2RMS 11:20 QC Sample Time:

Comments: 101921-CCR-LPLF2RMSD 11:26

Groundwater Purging and Sampling Form

SITE: Project Number: CCR **Well ID:** LPLF3

Field Team: SM KM Date: 10/19/21

Weather/Temp: Foggy / cool Arrival Time to Well: 10:46

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: **Initial DTW (ft btc):** 9.60'

Pump Setting [5]: Notes: Water level only

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (gal)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: **Sample Time:**

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL):

QC Sample ID : QC Sample Time:

Comments:

Groundwater Purging and Sampling Form

SITE: Project Number: CCR **Well ID:** LPLF4

Field Team: SM & KM Date: 10/19/21

Weather/Temp: Foggy & Cool Arrival Time to Well: 10:43

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: **Initial DTW (ft btc):** 8.62'

Pump Setting [5]: Notes: Water level only

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (gal)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: **Sample Time:**

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL):

QC Sample ID : QC Sample Time:

Comments:

Groundwater Purging and Sampling Form

SITE: Project Number: CCR **Well ID:** LPLF5

Field Team: SM & KM Date: 10/19/21

Weather/Temp: Foggy & Cool Arrival Time to Well: 10:37

Purge Method: ☐ Bladder ☐ Peristaltic ☐ Grab ☐ Other: **Initial DTW (ft btc):** 15.85

Pump Setting [5]: Notes: Dry - No Sample

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (gal)	pH	Sp. Cond. (mS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
	Begin Pumping								
									Dry
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 10 19 21 - CCR - LPLF5 **Sample Time:** N/A

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (GAL):

QC Sample ID : QC Sample Time:

Comments:

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF7R

Field Team: SM KM Date: 10/19/21

Weather/Temp: overcast / partly sunny cool Arrival Time to Well: 12:09

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 21.64

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
12:12	*Begin Pumping*								
12:17	21.78	200	6.48	2955	2.26	12.0	66.2		clear
12:22	21.86	600	6.44	2899	1.74	12.0	79.5		clear
12:27	21.99	900	6.43	2918	1.48	12.2	94.4		clear
	22.32								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 101921-CCR-LPLF7R **Sample Time:** 12:27

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☒ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : 101921-CCR-LPLF7RFD QC Sample Time: 12:33

Comments: _____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF8

Field Team: SM KM Date: 10/19/21

Weather/Temp: Cool, partly sunny Arrival Time to Well: 11:38

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 13.80

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
1141	*Begin Pumping*								
1146	14.27	450	5.95	3660	4.69	12.9	49.6		Clear
1151	14.48	900	5.95	3661	3.87	12.7	48.1		Clear
1156	14.65	1100	5.93	3661	3.45	12.7	47.6		Clear
	14.96								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: [redacted] 101921 - CCR - LPLF8 **Sample Time:** 11:56

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF 2R

Field Team: SM Date: 12/1/21

Weather/Temp: Cloudy, Cool, windy Arrival Time to Well: 7:54

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 3.96

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
759	*Begin Pumping*								
804	4.13	600	6.45	3722	1.72	12.4	33.6	-	clear
809	4.19	1100	6.43	3701	1.05	12.2	31.6	-	Clear
814	4.25	1600	6.44	3698	0.90	12.1	29.2	-	Clear
	4.25								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 12021 - CCR - LPLF2R **Sample Time:** 814

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Groundwater Purging and Sampling Form

SITE: TCM Project Number: CCR **Well ID:** LPLF8

Field Team: SM Date: 12/1/21

Weather/Temp: Cool, Cloudy, windy Arrival Time to Well: 8:27

Purge Method: ☐ Bladder ☒ Peristaltic ☐ Grab ☐ Other: _____ **Initial DTW (ft btc):** 11.79

Pump Setting [5]: 100 ml/min Notes: _____

Field Parameters									
Time [1]	DTW [2]	Purge Vol. (ml)	pH	Sp. Cond. (uS/cm)	DO (mg/L)	Temp (°C)	ORP (mV)	Turbidity (NTU)	Note color, odor, etc.
831	*Begin Pumping*								
836	12.26	400	6.09	3582	2.81	12.6	26.1	–	clear
841	12.66	850	6.07	3570	1.32	12.8	25.3	–	clear
846	12.88	1300	6.07	3572	1.08	12.8	25.2	–	clear
	13.19								
Stabilization Criteria [3]	-	-	± 0.1 units	± 3%	± 0.3 mg/L	-	± 10 mV	± 10% [4]	-

[1] Collect field parameters in consistent 3-5 minute intervals for Low-Flow method [2] DTW: Total drawdown should not exceed 0.33 ft for Low-Flow method

[3] Stabilization achieved after 3 successive readings for Low-Flow method; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] For turbidity readings > 10 NTUs [5] Low-flow target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: 120121-CCR-LPLF8 **Sample Time:** 846

Analysis: ☐ Appendix III (boron, calcium, chloride, fluoride, pH, sulfate, and TDS)

☐ Appendix IV (total metals, Radium 226, and Radium 228).

☐ Other, specify _____

QC SAMPLE : ☐ Field Duplicate ☐ MS/MSD ☐ EQ Rinsate Blank TOTAL PURGED (ml): _____

QC Sample ID : _____ QC Sample Time: _____

Comments: _____

_____

Appendix B
Laboratory Reports

June 15, 2021 Service Request No:K2105692

Dennis Morr
Transalta Centralia Mining, LLC
913 Big Hanaford Rd
Centralia, WA 98531

Laboratory Results for: LPLF CCR

Dear Dennis,

Enclosed are the results of the sample(s) submitted to our laboratory May 20, 2021
For your reference, these analyses have been assigned our service request number **K2105692.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kelley Lovejoy

Kelley Lovejoy
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2105692
Date Received: 05/20/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Five ground water samples were received for analysis at ALS Environmental on 05/20/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 06/15/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: LPLF 1			Lab ID: K2105692-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3040			5.0	mg/L	SM 2540 C
Chloride	3.02		0.06	0.20	mg/L	9056A
Sulfate	2610		4	40	mg/L	9056A
Boron	0.596		0.003	0.021	mg/L	6010C
Calcium	250		0.003	0.021	mg/L	6010C

CLIENT ID: LPLF 2R			Lab ID: K2105692-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3350			5.0	mg/L	SM 2540 C
Chloride	7.76		0.06	0.20	mg/L	9056A
Sulfate	1580		4	40	mg/L	9056A
Boron	0.377		0.003	0.021	mg/L	6010C
Calcium	477		0.003	0.021	mg/L	6010C

CLIENT ID: LPLF 7R			Lab ID: K2105692-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	2490			5.0	mg/L	SM 2540 C
Chloride	8.64		0.06	0.20	mg/L	9056A
Sulfate	1220		5	50	mg/L	9056A
Boron	0.375		0.003	0.021	mg/L	6010C
Calcium	223		0.003	0.021	mg/L	6010C

CLIENT ID: LPLF 8			Lab ID: K2105692-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3710			5.0	mg/L	SM 2540 C
Chloride	6.96		0.06	0.20	mg/L	9056A
Sulfate	2250		5	50	mg/L	9056A
Boron	1.11		0.003	0.021	mg/L	6010C
Calcium	398		0.003	0.021	mg/L	6010C

CLIENT ID: LPLF 8 FD			Lab ID: K2105692-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3710			5.0	mg/L	SM 2540 C
Chloride	6.92		0.06	0.20	mg/L	9056A
Sulfate	2210		5	50	mg/L	9056A
Boron	1.10		0.003	0.021	mg/L	6010C
Calcium	407		0.003	0.021	mg/L	6010C

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2105692-001	LPLF 1	5/19/2021	0745
K2105692-002	LPLF 2R	5/19/2021	0954
K2105692-003	LPLF 7R	5/19/2021	0824
K2105692-004	LPLF 8	5/19/2021	0905
K2105692-005	LPLF 8 FD	5/19/2021	0910

ADDRESS 1317 South 13th Ave., Kelso, WA 98626
PHONE 1 360 577 7222 FAX 1 360 636 1068

Part of the ALS Group A Campbell Brothers Limited Company

Work Order No.:

Chain of Custody K2105092

Project Manager:	Steve Mahr		**Bill to:**	Steve Mahr	
Client Name:	TransAlta Centralia Mining Company		**Company:**	TransAlta Centralia Mining	
Address:	913 Big Hanaford Road		**Address:**	913 Big Hanaford Road	
City, State ZIP:	Centralia, WA 98531		**City, State ZIP:**	Centralia, WA 98531	
Email:	steve_mahr@transalta.com	**Phone:** 360-330-8140	**Email:**	steve_mahr@transalta.com	**po#**
Project Name:	LPLF CCR				
Project Number:					
P.O. Number:	4700087976 Line 30				
Sampler's Name:	Steve Mahr				

SAMPLE RECEIPT

Temperature (°C):		Temp Blank Present	
Received Intact:	Yes No N/A	Wet Ice / Blue Ice	
Cooler Custody Seals:	Yes No N/A	Total Containers:	
Sample Custody Seals:	Yes No N/A		

REQUESTED ANALYSIS

TAT

- ☐ Routine 21day
- ☐ Same Day 100%
- ☐ Next Day ***
- ☐ 3 Day
- ☐ 5 Day 50%

Surcharges. Please call for availability

Due Date:

Comments

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers		SM 2540 C / TDS	9056A / Chloride	9056A / F	9056A / SO4	6010C / Metals T													
LPLF 1	GW	05/19/2021	7:45		2		X	X	X	X	X													
LPLF 2R	GW	05/19/2021	9:54		2		X	X	X	X	X													
LPLF 7R	GW	05/19/2021	8:24		2		X	X	X	X	X													
LPLF 7R MS	GW	05/19/2021	8:32		2		X	X	X	X	X													
LPLF 7R MSD	GW	05/19/2021	8:38		2		X	X	X	X	X													
LPLF 8	GW	05/19/2021	9:05		2		X	X	X	X	X													
LPLF 8 FD	GW	05/19/2021	9:10		2		X	X	X	X	X													

Dissolved	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr
Total	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr

Additional Methods Available Upon Request

RELINQUISHED BY			RECEIVED BY		
Print Name	Signature	Date/Time	Print Name	Signature	Date/Time
Steve Mahr		05/20/2021 1042	Cody Graves		5/20/21 1042
			Penny Jones	Penny Jones	5/24/21 1030

PM VL

Cooler Receipt and Preservation Form

Client Trans Alta Centralia Mining Co Service Request K21 05492

Received: 5/20/21 Opened: 5/20/21 By: RT Unloaded: 5/20/21 By: RT

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.6		IR02		—	—	934024920967	

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Transalta Centralia Mining, LLC **Service Request:** K2105692
Project: LPLF CCR/

Sample Name: LPLF 1 **Date Collected:** 05/19/21
Lab Code: K2105692-001 **Date Received:** 05/20/21
Sample Matrix: Ground Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY
9056A		KABROWN
SM 2540 C		MSPECHT

Sample Name: LPLF 2R **Date Collected:** 05/19/21
Lab Code: K2105692-002 **Date Received:** 05/20/21
Sample Matrix: Ground Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY
9056A		KABROWN
SM 2540 C		MSPECHT

Sample Name: LPLF 7R **Date Collected:** 05/19/21
Lab Code: K2105692-003 **Date Received:** 05/20/21
Sample Matrix: Ground Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY
9056A		KABROWN
SM 2540 C		MSPECHT

Sample Name: LPLF 8 **Date Collected:** 05/19/21
Lab Code: K2105692-004 **Date Received:** 05/20/21
Sample Matrix: Ground Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY
9056A		KABROWN
SM 2540 C		MSPECHT

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR/		

Sample Name:	LPLF 8 FD	**Date Collected:**	05/19/21
Lab Code:	K2105692-005	**Date Received:**	05/20/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY
9056A		KABROWN
SM 2540 C		MSPECHT

Sample Results

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Metals

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 07:45
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 1	**Basis:**	NA
Lab Code:	K2105692-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.596**	mg/L	0.021	0.003	1	06/14/21 10:07	06/03/21	
Calcium	6010C	**250**	mg/L	0.021	0.003	1	06/14/21 10:07	06/03/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:54
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 2R	**Basis:**	NA
Lab Code:	K2105692-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.377**	mg/L	0.021	0.003	1	06/14/21 10:09	06/03/21	
Calcium	6010C	**477**	mg/L	0.021	0.003	1	06/14/21 10:09	06/03/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 08:24
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 7R	**Basis:**	NA
Lab Code:	K2105692-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.375**	mg/L	0.021	0.003	1	06/14/21 10:12	06/03/21	
Calcium	6010C	**223**	mg/L	0.021	0.003	1	06/14/21 10:12	06/03/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:05
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 8	**Basis:**	NA
Lab Code:	K2105692-004		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**1.11**	mg/L	0.021	0.003	1	06/14/21 10:22	06/03/21	
Calcium	6010C	**398**	mg/L	0.021	0.003	1	06/14/21 10:22	06/03/21	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:10
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 8 FD	**Basis:**	NA
Lab Code:	K2105692-005		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**1.10**	mg/L	0.021	0.003	1	06/14/21 10:25	06/03/21	
Calcium	6010C	**407**	mg/L	0.021	0.003	1	06/14/21 10:25	06/03/21	

General Chemistry

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 07:45
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 1	**Basis:**	NA
Lab Code:	K2105692-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	**3.02**	mg/L	0.20	0.06	2	06/11/21 16:39	
Fluoride	9056A	ND U	mg/L	0.40	0.006	2	06/11/21 16:39	
Sulfate	9056A	**2610**	mg/L	40	4	400	06/11/21 18:12	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 07:45
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 1	**Basis:**	NA
Lab Code:	K2105692-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3040**	mg/L	5.0	-	1	05/26/21 20:45	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:54
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 2R	**Basis:**	NA
Lab Code:	K2105692-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	**7.76**	mg/L	0.20	0.06	2	06/11/21 16:50	
Fluoride	9056A	ND U	mg/L	0.40	0.006	2	06/11/21 16:50	
Sulfate	9056A	**1580**	mg/L	40	4	400	06/11/21 18:23	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:54
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 2R	**Basis:**	NA
Lab Code:	K2105692-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3350**	mg/L	5.0	-	1	05/26/21 20:45	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 08:24
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 7R	**Basis:**	NA
Lab Code:	K2105692-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	**8.64**	mg/L	0.20	0.06	2	06/11/21 17:02	
Fluoride	9056A	ND U	mg/L	0.40	0.006	2	06/11/21 17:02	
Sulfate	9056A	**1220**	mg/L	50	5	500	06/11/21 18:59	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 08:24
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 7R	**Basis:**	NA
Lab Code:	K2105692-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**2490**	mg/L	5.0	-	1	05/26/21 20:45	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:05
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 8	**Basis:**	NA
Lab Code:	K2105692-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	**6.96**	mg/L	0.20	0.06	2	06/11/21 17:48	
Fluoride	9056A	ND U	mg/L	0.40	0.006	2	06/11/21 17:48	
Sulfate	9056A	**2250**	mg/L	50	5	500	06/11/21 19:45	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:05
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 8	**Basis:**	NA
Lab Code:	K2105692-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3710**	mg/L	5.0	-	1	05/26/21 20:45	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:10
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 8 FD	**Basis:**	NA
Lab Code:	K2105692-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	**6.92**	mg/L	0.20	0.06	2	06/11/21 18:00	
Fluoride	9056A	ND U	mg/L	0.40	0.006	2	06/11/21 18:00	
Sulfate	9056A	**2210**	mg/L	50	5	500	06/11/21 19:57	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21 09:10
Sample Matrix:	Ground Water	**Date Received:**	05/20/21 10:30
Sample Name:	LPLF 8 FD	**Basis:**	NA
Lab Code:	K2105692-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3710**	mg/L	5.0	-	1	05/26/21 20:45	

QC Summary Forms

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2109981-02		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	ND U	mg/L	0.021	0.003	1	06/14/21 10:02	06/03/21	
Calcium	6010C	ND U	mg/L	0.021	0.003	1	06/14/21 10:02	06/03/21	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	05/19/21
Sample Matrix:	Ground Water	**Date Received:**	05/20/21
		Date Analyzed:	06/14/21
		Date Extracted:	06/3/21

Matrix Spike Summary
Total Metals

Sample Name:	LPLF 7R	**Units:**	mg/L
Lab Code:	K2105692-003	**Basis:**	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2109981-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Boron	0.375	0.916	0.500	108	75-125
Calcium	223	235	10.0	123 #	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project	LPLF CCR	**Date Collected:**	05/19/21
Sample Matrix:	Ground Water	**Date Received:**	05/20/21
		Date Analyzed:	06/14/21

Replicate Sample Summary
Total Metals

Sample Name:	LPLF 7R	**Units:**	mg/L
Lab Code:	K2105692-003	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2109981-03 Result	Average	RPD	RPD Limit
Boron	6010C	0.021	0.003	0.375	0.382	0.379	2	20
Calcium	6010C	0.021	0.003	223	219	221	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2105692
Date Analyzed: 06/14/21

Lab Control Sample Summary
Total Metals

Units:mg/L
Basis:NA

Lab Control Sample
KQ2109981-01

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Boron	6010C	0.478	0.500	96	80-120
Calcium	6010C	11.7	12.5	93	80-120

General Chemistry

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2105692-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	ND	U	mg/L	0.10	0.03	1	06/11/21 14:29	
Fluoride	9056A	ND	U	mg/L	0.20	0.003	1	06/11/21 14:29	
Sulfate	9056A	ND	U	mg/L	0.10	0.01	1	06/11/21 14:29	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2105692-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	-	1	05/26/21 20:45	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2105692-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	9056A	ND	U	mg/L	0.10	0.03	1	06/11/21 21:42	
Fluoride	9056A	ND	U	mg/L	0.20	0.003	1	06/11/21 21:42	
Sulfate	9056A	ND	U	mg/L	0.10	0.01	1	06/11/21 21:42	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2105692-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	-	1	05/26/21 20:45	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request:K2105692
Date Collected:05/19/21
Date Received:05/20/21
Date Analyzed:6/11/21

Duplicate Matrix Spike Summary
General Chemistry Parameters

Sample Name: LPLF 7R
Lab Code: K2105692-003

Units:mg/L
Basis:NA

			Matrix Spike K2105692-003MS			Duplicate Matrix Spike K2105692-003DMS					
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Fluoride	9056A	ND U	8.66	8.00	108	8.74	8.00	109	80-120	<1	20
Chloride	9056A	8.64	16.1	8.00	93	16.1	8.00	93	80-120	<1	20
Sulfate	9056A	1220	3170	2000	98	3220	2000	100	90-110	1	20

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2105692
Project	LPLF CCR	**Date Collected:**	05/19/21
Sample Matrix:	Ground Water	**Date Received:**	05/20/21
		Date Analyzed:	05/26/21 - 06/11/21

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	LPLF 7R	**Units:**	mg/L
Lab Code:	K2105692-003	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2105692-003DUP Result	Average	RPD	RPD Limit
Chloride	9056A	0.20	0.06	8.64	8.46	8.55	2	20
Fluoride	9056A	0.40	0.006	ND U	ND U	NC	NC	20
Solids, Total Dissolved	SM 2540 C	5.0	-	2490	2480	2480	<1	5
Sulfate	9056A	50	5	1220	1230	1220	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2105692
Date Analyzed: 05/26/21 - 06/11/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2105692-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056A	4.77	5.00	95	80-120
Fluoride	9056A	4.63	5.00	93	90-110
Solids, Total Dissolved	SM 2540 C	898	922	97	85-115
Sulfate	9056A	4.86	5.00	97	90-110

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2105692
Date Analyzed: 06/11/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2105692-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056A	4.88	5.00	98	80-120
Fluoride	9056A	5.14	5.00	103	90-110
Sulfate	9056A	4.98	5.00	100	90-110

July 13, 2021 Service Request No:K2107152

Dennis Morr
Transalta Centralia Mining, LLC
913 Big Hanaford Rd
Centralia, WA 98531

Laboratory Results for: LPLF CCR

Dear Dennis,

Enclosed are the results of the sample(s) submitted to our laboratory June 21, 2021
For your reference, these analyses have been assigned our service request number **K2107152.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kelley Lovejoy

Kelley Lovejoy
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2107152
Date Received: 06/21/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Two ground water samples were received for analysis at ALS Environmental on 06/21/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 07/13/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: 062121-CCR-LPLF2R			Lab ID: K2107152-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3380			5.0	mg/L	SM 2540 C
Boron	0.349			0.021	mg/L	6010C

CLIENT ID: 062121-CCR-LPLF8			Lab ID: K2107152-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Boron	1.03			0.021	mg/L	6010C

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2107152-001	062121-CCR-LPLF2R	6/21/2021	0820
K2107152-002	062121-CCR-LPLF8	6/21/2021	0857

K2107152

ADDRESS 1317 South 13th Ave., Kelso, WA 98626
PHONE 1 360 577 7222 FAX 1 360 636 1068
Part of the ALS Group A Campbell Brothers Limited Company

Work Order No.:

Chain of Custody

Project Manager:	Steve Mahr			**Bill to:**	Steve Mahr		
Client Name:	TransAlta Centralia Mining Company			**Company:**	TransAlta Centralia Mining		
Address:	913 Big Hanaford Road			**Address:**	913 Big Hanaford Road		
City, State ZIP:	Centralia, WA 98531			**City, State ZIP:**	Centralia, WA 98531		
Email:	steve_mahr@transalta.com	**Phone:**	360-330-8140	**Email:**	steve_mahr@transalta.com	**po#**	
Project Name:	LPLF CCR						
Project Number:							
P.O. Number:	4700087976 Line 30						
Sampler's Name:	Steve Mahr						

SAMPLE RECEIPT

Temperature (°C):		Temp Blank Present		
Received Intact:	Yes	No	N/A	Wet Ice / Blue Ice
Cooler Custody Seals:	Yes	No	N/A	Total Containers:
Sample Custody Seals:	Yes	No	N/A	

REQUESTED ANALYSIS

TAT

- ☐ Routine 21day
- ☐ Same Day 100%
- ☐ Next Day ***
- ☐ 3 Day
- ☐ 5 Day 50%

Surcharges. Please call for availability

Due Date:

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers	SM 2540 C / TDS	9056A / Chloride	9056A / F	9056A / SO4	6010C / Metals T	Comments
062121-CCR-LPLF2R	GW	06/21/2021	8:20		2	X				X	TDS, Boron only
062121-CCR-LPLF8	GW	06/21/2021	8:57		2					X	Boron only

Dissolved	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr
Total	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr

Additional Methods Available Upon Request

RELINQUISHED BY			RECEIVED BY		
Print Name	Signature	Date/Time	Print Name	Signature	Date/Time
Steve Mahr		06/21/2021 1157	Perry Jones	Perry Jones	6/21/21 1200

PM KL

Cooler Receipt and Preservation Form

Client Trans Alta Centralia Service Request K21 07151

Received: 6-21-21 Opened: 6-21-21 By: PJ Unloaded: 6-21-21 By: PJ

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N PJ

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
1.7		IR01					

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: Received TPS bottle for 062121-CCR-LPLF8. COC only requests metals.

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR/
Service Request: K2107152

Sample Name: 062121-CCR-LPLF2R
Lab Code: K2107152-001
Sample Matrix: Ground Water
Date Collected: 06/21/21
Date Received: 06/21/21

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY
SM 2540 C		MSPECHT

Sample Name: 062121-CCR-LPLF8
Lab Code: K2107152-002
Sample Matrix: Ground Water
Date Collected: 06/21/21
Date Received: 06/21/21

Analysis Method	Extracted/Digested By	Analyzed By
6010C	ABOYER	AMCKORNEY

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	06/21/21 08:20
Sample Matrix:	Ground Water	**Date Received:**	06/21/21 12:00
Sample Name:	062121-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2107152-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.349**	mg/L	0.021	1	07/12/21 10:58	06/29/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	06/21/21 08:57
Sample Matrix:	Ground Water	**Date Received:**	06/21/21 12:00
Sample Name:	062121-CCR-LPLF8	**Basis:**	NA
Lab Code:	K2107152-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**1.03**	mg/L	0.021	1	07/12/21 11:09	06/29/21	

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	06/21/21 08:20
Sample Matrix:	Ground Water	**Date Received:**	06/21/21 12:00
Sample Name:	062121-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2107152-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3380**	mg/L	5.0	1	06/25/21 17:05	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2111809-02		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	ND U	mg/L	0.021	1	07/12/21 10:53	06/29/21	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	06/21/21
Sample Matrix:	Ground Water	**Date Received:**	06/21/21
		Date Analyzed:	07/12/21
		Date Extracted:	06/29/21

Matrix Spike Summary
Total Metals

Sample Name:	062121-CCR-LPLF2R	**Units:**	mg/L
Lab Code:	K2107152-001	**Basis:**	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2111809-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Boron	0.349	0.849	0.500	100	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project	LPLF CCR	**Date Collected:**	06/21/21
Sample Matrix:	Ground Water	**Date Received:**	06/21/21
		Date Analyzed:	07/12/21

Replicate Sample Summary
Total Metals

Sample Name:	062121-CCR-LPLF2R	**Units:**	mg/L
Lab Code:	K2107152-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2111809-03 Result	Average	RPD	RPD Limit
Boron	6010C	0.021	0.349	0.351	0.350	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2107152
Date Analyzed: 07/12/21

Lab Control Sample Summary
Total Metals

Units:mg/L
Basis:NA

Lab Control Sample
KQ2111809-01

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Boron	6010C	0.481	0.500	96	80-120

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2107152-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	06/25/21 17:05	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2107152-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	06/25/21 17:05	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2107152
Project:	LPLF CCR	**Date Analyzed:**	06/25/21
Sample Matrix:	Ground Water	**Date Extracted:**	NA

Lab Control Sample Summary
Solids, Total Dissolved

Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	728927

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2107152-LCS	916	922	99	85-115

November 17, 2021 Service Request No:K2112248

Dennis Morr
Transalta Centralia Mining, LLC
913 Big Hanaford Rd
Centralia, WA 98531

Laboratory Results for: LPLF CCR

Dear Dennis,

Enclosed are the results of the sample(s) submitted to our laboratory October 19, 2021
For your reference, these analyses have been assigned our service request number **K2112248.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Kelley Lovejoy

Kelley Lovejoy
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2112248
Date Received: 10/19/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Five ground water samples were received for analysis at ALS Environmental on 10/19/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 11/16/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: 101921-CCR-LPLF1			Lab ID: K2112248-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	2950			10	mg/L	SM 2540 C
Chloride	3.14			0.50	mg/L	9056A
Sulfate	2350			50	mg/L	9056A
Boron	0.601			0.021	mg/L	6010C
Calcium	241			0.021	mg/L	6010C

CLIENT ID: 101921-CCR-LPLF2R			Lab ID: K2112248-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3500			10	mg/L	SM 2540 C
Chloride	7.25			0.50	mg/L	9056A
Sulfate	1730			50	mg/L	9056A
Boron	0.366			0.021	mg/L	6010C
Calcium	507			0.021	mg/L	6010C

CLIENT ID: 101921-CCR-LPLF8			Lab ID: K2112248-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3680			10	mg/L	SM 2540 C
Chloride	6.75			0.50	mg/L	9056A
Sulfate	3440			50	mg/L	9056A
Boron	1.24			0.11	mg/L	6010C
Calcium	416			0.11	mg/L	6010C

CLIENT ID: 101921-CCR-LPLF7R			Lab ID: K2112248-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	2490			5.0	mg/L	SM 2540 C
Chloride	8.46			0.50	mg/L	9056A
Sulfate	1870			50	mg/L	9056A
Boron	0.353			0.021	mg/L	6010C
Calcium	233			0.021	mg/L	6010C

CLIENT ID: 101921-CCR-LPLF7R FD			Lab ID: K2112248-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	2490			5.0	mg/L	SM 2540 C
Chloride	8.47			0.50	mg/L	9056A
Sulfate	1600			50	mg/L	9056A
Boron	0.338			0.021	mg/L	6010C
Calcium	226			0.021	mg/L	6010C

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Transalta Centralia Mining, LLC **Service Request:**K2112248
Project: LPLF CCR

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2112248-001	101921-CCR-LPLF1	10/19/2021	1020
K2112248-002	101921-CCR-LPLF2R	10/19/2021	1115
K2112248-003	101921-CCR-LPLF8	10/19/2021	1156
K2112248-004	101921-CCR-LPLF7R	10/19/2021	1227
K2112248-005	101921-CCR-LPLF7R FD	10/19/2021	1233

K2112248

ADDRESS 1317 South 13th Ave., Kelso, WA 98626
PHONE 1 360 577 7222 FAX 1 360 636 1068

Work Order No.:

Chain of Custody

Part of the ALS Group A Campbell Brothers Limited Company

Project Manager:	Steve Mahr		**Bill to:**	Steve Mahr	
Client Name:	TransAlta Centralia Mining Company		**Company:**	TransAlta Centralia Mining	
Address:	913 Big Hanaford Road		**Address:**	913 Big Hanaford Road	
City, State ZIP:	Centralia, WA 98531		**City, State ZIP:**	Centralia, WA 98531	
Email:	steve_mahr@transalta.com	**Phone:** 360-330-8140	**Email:**	steve_mahr@transalta.com	**po#**
Project Name:	LPLF CCR				
Project Number:					
P.O. Number:	4700087976 Line 30				
Sampler's Name:	Steve Mahr				

SAMPLE RECEIPT

Temperature (°C):		Temp Blank Present		
Received Intact:	Yes	No	N/A	Wet Ice / Blue Ice
Cooler Custody Seals:	Yes	No	N/A	Total Containers:
Sample Custody Seals:	Yes	No	N/A	

REQUESTED ANALYSIS

TAT

- ☐ Routine 21day
- ☐ Same Day 100%
- ☐ Next Day ***
- ☐ 3 Day
- ☐ 5 Day 50%

Surcharges. Please call for availability

Due Date:

Comments

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers		SM 2540 C / TDS	9056A / Chloride	9056A / F	9056A / SO4	6010C / Metals T
101921-CCR-LPLF1	GW	10/19/2021	10:20		2		X	X	X	X	X
101921-CCR-LPLF2R	GW	10/19/2021	11:15		2		X	X	X	X	X
101921-CCR-LPLF2R MS	GW	10/19/2021	11:20		2		X	X	X	X	X
101921-CCR-LPLF2R MSD	GW	10/19/2021	11:26		2		X	X	X	X	X
101921-CCR-LPLF8	GW	10/19/2021	11:56		2		X	X	X	X	X
101921-CCR-LPLF7R	GW	10/19/2021	12:27		2		X	X	X	X	X
101921-CCR-LPLF7R FD	GW	10/19/2021	12:33		2		X	X	X	X	X

Dissolved	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr
Total	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr

Additional Methods Available Upon Request

RELINQUISHED BY			RECEIVED BY		
Print Name	Signature	Date/Time	Print Name	Signature	Date/Time
Steve Mahr		10/19/2021 1524			10/19/21 1524

PM KL

Cooler Receipt and Preservation Form

Client Transalta Centralia Mining Service Request K21 12248

Received: 10/19/21 Opened: 10/19/21 By: mm Unloaded: 10/19/21 By: mm

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
4.2		1202					

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
101921-CCR-LPLF1	1-125ml			X	HNO_3	.5ml	RE1-56-m	mm	1635
101921-CCR LPLF2R	1-125ml			X	HNO_3	.5ml	RE1-56-m	mm	1635
101921-CCR-LPLF2RMS	1-125ml			X	HNO_3	.5ml	RE1-56-m	mm	1635
101921-CCR-LPLF2RMSD	1-125ml			X	HNO_3	.5ml	RE1-56-m	mm	1635

Notes, Discrepancies, Resolutions: _____

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR/		

Sample Name:	101921-CCR-LPLF1	**Date Collected:**	10/19/21
Lab Code:	K2112248-001	**Date Received:**	10/19/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY
9056A		KABROWN
SM 2540 C		JSANCHEZ

Sample Name:	101921-CCR-LPLF2R	**Date Collected:**	10/19/21
Lab Code:	K2112248-002	**Date Received:**	10/19/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY
9056A		KABROWN
SM 2540 C		JSANCHEZ

Sample Name:	101921-CCR-LPLF2R	**Date Collected:**	10/19/21
Lab Code:	K2112248-002.R01	**Date Received:**	10/19/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
9056A		KABROWN

Sample Name:	101921-CCR-LPLF8	**Date Collected:**	10/19/21
Lab Code:	K2112248-003	**Date Received:**	10/19/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY
9056A		KABROWN
SM 2540 C		JSANCHEZ

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR/		

Sample Name:	101921-CCR-LPLF7R	**Date Collected:**	10/19/21
Lab Code:	K2112248-004	**Date Received:**	10/19/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY
9056A		KABROWN
SM 2540 C		JSANCHEZ

Sample Name:	101921-CCR-LPLF7R FD	**Date Collected:**	10/19/21
Lab Code:	K2112248-005	**Date Received:**	10/19/21
Sample Matrix:	Ground Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY
9056A		KABROWN
SM 2540 C		JSANCHEZ

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 10:20
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF1	**Basis:**	NA
Lab Code:	K2112248-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.601**	mg/L	0.021	1	10/26/21 12:29	10/21/21	
Calcium	6010C	**241**	mg/L	0.021	1	10/26/21 12:29	10/21/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 11:15
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2112248-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.366**	mg/L	0.021	1	10/26/21 12:32	10/21/21	
Calcium	6010C	**507**	mg/L	0.021	1	10/26/21 12:32	10/21/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 11:56
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF8	**Basis:**	NA
Lab Code:	K2112248-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**1.24**	mg/L	0.11	5	10/26/21 13:00	10/21/21	
Calcium	6010C	**416**	mg/L	0.11	5	10/26/21 13:00	10/21/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 12:27
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF7R	**Basis:**	NA
Lab Code:	K2112248-004		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.353**	mg/L	0.021	1	10/26/21 13:02	10/21/21	
Calcium	6010C	**233**	mg/L	0.021	1	10/26/21 13:02	10/21/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 12:33
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF7R FD	**Basis:**	NA
Lab Code:	K2112248-005		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**0.338**	mg/L	0.021	1	10/26/21 13:05	10/21/21	
Calcium	6010C	**226**	mg/L	0.021	1	10/26/21 13:05	10/21/21	

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 10:20
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF1	**Basis:**	NA
Lab Code:	K2112248-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	**3.14**	mg/L	0.50	5	10/28/21 18:56	
Fluoride	9056A	ND U	mg/L	1.0	5	10/28/21 18:56	
Sulfate	9056A	**2350**	mg/L	50	500	10/28/21 19:06	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 10:20
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF1	**Basis:**	NA
Lab Code:	K2112248-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**2950**	mg/L	10	1	10/20/21 17:20	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 11:15
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2112248-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	**7.25**	mg/L	0.50	5	10/29/21 15:08	
Fluoride	9056A	ND U	mg/L	1.0	5	10/28/21 19:47	
Sulfate	9056A	**1730**	mg/L	50	500	10/29/21 14:58	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 11:15
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2112248-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3500**	mg/L	10	1	10/20/21 17:20	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 11:56
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF8	**Basis:**	NA
Lab Code:	K2112248-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	**6.75**	mg/L	0.50	5	10/28/21 21:28	
Fluoride	9056A	ND U	mg/L	1.0	5	10/28/21 21:28	
Sulfate	9056A	**3440**	mg/L	50	500	10/28/21 21:38	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 11:56
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF8	**Basis:**	NA
Lab Code:	K2112248-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3680**	mg/L	10	1	10/20/21 17:20	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 12:27
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF7R	**Basis:**	NA
Lab Code:	K2112248-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	**8.46**	mg/L	0.50	5	10/28/21 21:48	
Fluoride	9056A	ND U	mg/L	1.0	5	10/28/21 21:48	
Sulfate	9056A	**1870**	mg/L	50	500	10/28/21 21:58	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 12:27
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF7R	**Basis:**	NA
Lab Code:	K2112248-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**2490**	mg/L	5.0	1	10/20/21 17:20	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 12:33
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF7R FD	**Basis:**	NA
Lab Code:	K2112248-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	**8.47**	mg/L	0.50	5	10/28/21 22:08	
Fluoride	9056A	ND U	mg/L	1.0	5	10/28/21 22:08	
Sulfate	9056A	**1600**	mg/L	50	500	10/28/21 22:18	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21 12:33
Sample Matrix:	Ground Water	**Date Received:**	10/19/21 15:24
Sample Name:	101921-CCR-LPLF7R FD	**Basis:**	NA
Lab Code:	K2112248-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**2490**	mg/L	5.0	1	10/20/21 17:20	

QC Summary Forms

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Metals

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2120693-04		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	ND U	mg/L	0.021	1	10/26/21 12:24	10/21/21	
Calcium	6010C	ND U	mg/L	0.021	1	10/26/21 12:24	10/21/21	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	10/19/21
Sample Matrix:	Ground Water	**Date Received:**	10/19/21
		Date Analyzed:	10/26/21
		Date Extracted:	10/21/21

Matrix Spike Summary
Total Metals

Sample Name:	101921-CCR-LPLF2R	**Units:**	mg/L
Lab Code:	K2112248-002	**Basis:**	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2120693-01

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Boron	0.366	0.847	0.500	96	75-125
Calcium	507	514	10.0	68 #	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project	LPLF CCR	**Date Collected:**	10/19/21
Sample Matrix:	Ground Water	**Date Received:**	10/19/21
		Date Analyzed:	10/26/21

Replicate Sample Summary
Total Metals

Sample Name:	101921-CCR-LPLF2R	**Units:**	mg/L
Lab Code:	K2112248-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2120693-05 Result	Average	RPD	RPD Limit
Boron	6010C	0.021	0.366	0.353	0.360	4	20
Calcium	6010C	0.021	507	501	504	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2112248
Date Analyzed: 10/26/21

Lab Control Sample Summary
Total Metals

Units:mg/L
Basis:NA

Lab Control Sample
KQ2120693-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Boron	6010C	0.519	0.500	104	80-120
Calcium	6010C	12.8	12.5	103	80-120

General Chemistry

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2112248-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	ND U	mg/L	0.10	1	10/28/21 12:52	
Fluoride	9056A	ND U	mg/L	0.20	1	10/28/21 12:52	
Sulfate	9056A	ND U	mg/L	0.10	1	10/28/21 12:52	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2112248-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	10/20/21 17:20	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2112248-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	ND U	mg/L	0.10	1	10/28/21 19:37	
Fluoride	9056A	ND U	mg/L	0.20	1	10/28/21 19:37	
Sulfate	9056A	ND U	mg/L	0.10	1	10/28/21 19:37	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2112248-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	1	10/20/21 17:20	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2112248-MB3		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Chloride	9056A	ND U	mg/L	0.10	1	10/29/21 12:26	
Sulfate	9056A	ND U	mg/L	0.10	1	10/29/21 12:26	

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request:K2112248
Date Collected:10/19/21
Date Received:10/19/21
Date Analyzed:10/28/21 - 10/29/21

Duplicate Matrix Spike Summary
General Chemistry Parameters

Sample Name: 101921-CCR-LPLF2R
Lab Code: K2112248-002

Units:mg/L
Basis:NA

			Matrix Spike				Duplicate Matrix Spike				
			K2112248-002MS				K2112248-002DMS				
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Fluoride	9056A	ND U	18.4	20.0	92	17.7	20.0	88	80-120	4	20
Chloride	9056A	7.25	26.4	20.0	96	24.0	20.0	84	80-120	9	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2112248
Project	LPLF CCR	**Date Collected:**	10/19/21
Sample Matrix:	Ground Water	**Date Received:**	10/19/21
		Date Analyzed:	10/20/21 - 10/29/21

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	101921-CCR-LPLF2R	**Units:**	mg/L
Lab Code:	K2112248-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K2112248-002DUP Result	Average	RPD	RPD Limit
Chloride	9056A	0.50	7.25	7.37	7.31	2	20
Fluoride	9056A	1.0	ND U	ND U	NC	NC	20
Solids, Total Dissolved	SM 2540 C	10	3500	3510	3500	<1	5

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2112248
Date Analyzed: 10/20/21 - 10/28/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2112248-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056A	4.78	5.00	96	80-120
Fluoride	9056A	4.89	5.00	98	90-110
Solids, Total Dissolved	SM 2540 C	1890	1920	99	85-115
Sulfate	9056A	4.93	5.00	99	90-110

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2112248
Date Analyzed: 10/28/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2112248-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056A	4.81	5.00	96	80-120
Fluoride	9056A	4.94	5.00	99	90-110
Sulfate	9056A	5.02	5.00	100	90-110

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2112248
Date Analyzed: 10/29/21

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2112248-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	9056A	4.78	5.00	96	80-120
Sulfate	9056A	4.90	5.00	98	90-110

December 23, 2021 Service Request No:K2113925

Dennis Morr
Transalta Centralia Mining, LLC
913 Big Hanaford Rd
Centralia, WA 98531

Laboratory Results for: LPLF CCR

Dear Dennis,

Enclosed are the results of the sample(s) submitted to our laboratory December 02, 2021
For your reference, these analyses have been assigned our service request number **K2113925.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3350. You may also contact me via email at Kelley.Lovejoy@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Karla Smith

for Kelley Lovejoy
Project Manager

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ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

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Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Ground Water

Service Request: K2113925
Date Received: 12/02/2021

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Two ground water samples were received for analysis at ALS Environmental on 12/02/2021. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by Kelley Lovejoy Date 12/23/2021

SAMPLE DETECTION SUMMARY

CLIENT ID: 120121-CCR-LPLF2R			Lab ID: K2113925-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Solids, Total Dissolved	3450			10	mg/L	SM 2540 C
Boron	346		3	21	ug/L	6010C

CLIENT ID: 120121-CCR-LPLF8			Lab ID: K2113925-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Boron	1010		3	21	ug/L	6010C

Sample Receipt Information

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Client: Transalta Centralia Mining, LLC **Service Request:**K2113925
Project: LPLF CCR

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2113925-001	120121-CCR-LPLF2R	12/1/2021	0814
K2113925-002	120121-CCR-LPLF8	12/1/2021	0846

ADDRESS 1317 South 13th Ave., Kelso, WA 98626
PHONE 1 360 577 7222 FAX 1 360 636 1068

Part of the ALS Group A Campbell Brothers Limited Company

Work Order No.: KJL3925

Chain of Custody

Project Manager:	Steve Mahr		**Bill to:**	Steve Mahr	
Client Name:	TransAlta Centralia Mining Company		**Company:**	TransAlta Centralia Mining	
Address:	913 Big Hanaford Road		**Address:**	913 Big Hanaford Road	
City, State ZIP:	Centralia, WA 98531		**City, State ZIP:**	Centralia, WA 98531	
Email:	steve_mahr@transalta.com	**Phone:** 360-330-8140	**Email:**	steve_mahr@transalta.com	**po#**
Project Name:	LPLF CCR				
Project Number:					
P.O. Number:	4700087976 Line 30				
Sampler's Name:	Steve Mahr				

SAMPLE RECEIPT

Temperature (°C):		Temp Blank Present		
Received Intact:	Yes	No	N/A	Wet Ice / Blue Ice
Cooler Custody Seals:	Yes	No	N/A	Total Containers:
Sample Custody Seals:	Yes	No	N/A	

REQUESTED ANALYSIS

TAT

- ☐ Routine 21day
- ☐ Same Day 100%
- ☐ Next Day ***
- ☐ 3 Day
- ☐ 5 Day 50%

Surcharges. Please call for availability

Due Date:

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers	SM 2540 C / TDS	9056A / Chloride	9056A / F	9056A / SO4	6010C / Metals T	Comments
120121-CCR-LPLF2R	GW	12/01/2021	8:14		2	X				X	TDS, Boron only
120121-CCR-LPLF8	GW	12/01/2021	8:46		2					X	Boron only

Dissolved	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr
Total	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Tl, V, Zn, Zr

Additional Methods Available Upon Request

RELINQUISHED BY			RECEIVED BY		
Print Name	Signature	Date/Time	Print Name	Signature	Date/Time
Steve Mahr		12/02/2021 1052	MacKenzie Mulligan		12/2/21 1055

PM Kelly

Cooler Receipt and Preservation Form

Client TransAlta Service Request K21 L3925

Received: 12/2/21 Opened: 12/2/21 By: MM Unloaded: 12/2/21 By: MM

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column below:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
3.0		IR01					

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA ~~Y~~ N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: Rec'd 250mL unp. BTL for 120121-CCR-LRLF8 but not requesting Analysis -

Miscellaneous Forms

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Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR/		

Sample Name:	120121-CCR-LPLF2R	**Date Collected:**	12/1/21
Lab Code:	K2113925-001	**Date Received:**	12/2/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY
SM 2540 C		JSANCHEZ

Sample Name:	120121-CCR-LPLF8	**Date Collected:**	12/1/21
Lab Code:	K2113925-002	**Date Received:**	12/2/21
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	SSOLADEY	AMCKORNEY

Sample Results

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Metals

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	12/01/21 08:14
Sample Matrix:	Ground Water	**Date Received:**	12/02/21 10:55
Sample Name:	120121-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2113925-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**346**	ug/L	21	3	1	12/10/21 08:46	12/06/21	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	12/01/21 08:46
Sample Matrix:	Ground Water	**Date Received:**	12/02/21 10:55
Sample Name:	120121-CCR-LPLF8	**Basis:**	NA
Lab Code:	K2113925-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	**1010**	ug/L	21	3	1	12/10/21 08:25	12/06/21	

General Chemistry

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	12/01/21 08:14
Sample Matrix:	Ground Water	**Date Received:**	12/02/21 10:55
Sample Name:	120121-CCR-LPLF2R	**Basis:**	NA
Lab Code:	K2113925-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**3450**	mg/L	10	-	1	12/07/21 17:27	

QC Summary Forms

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Metals

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2123585-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Boron	6010C	ND U	ug/L	21	3	1	12/10/21 08:17	12/06/21	

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	12/01/21
Sample Matrix:	Water	**Date Received:**	12/02/21
		Date Analyzed:	12/10/21
		Date Extracted:	12/6/21

Matrix Spike Summary
Total Metals

Sample Name:	120121-CCR-LPLF8	**Units:**	ug/L
Lab Code:	K2113925-002	**Basis:**	NA
Analysis Method:	6010C		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2123585-03

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Boron	1010	1480	500	92	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

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QA/QC Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project	LPLF CCR	**Date Collected:**	12/01/21
Sample Matrix:	Ground Water	**Date Received:**	12/02/21
		Date Analyzed:	12/10/21

Replicate Sample Summary

Total Metals

Sample Name:	120121-CCR-LPLF8	**Units:**	ug/L
Lab Code:	K2113925-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2123585-04 Result	Average	RPD	RPD Limit
Boron	6010C	21	3	1010	1000	1010	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client: Transalta Centralia Mining, LLC
Project: LPLF CCR
Sample Matrix: Water

Service Request: K2113925
Date Analyzed: 12/10/21

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2123585-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Boron	6010C	490	500	98	80-120

General Chemistry

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Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2113925-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	-	1	12/07/21 17:27	

Analytical Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2113925-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	5.0	-	1	12/07/21 17:27	

ALS Group USA, Corp.
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QA/QC Report

Client:	Transalta Centralia Mining, LLC	**Service Request:**	K2113925
Project:	LPLF CCR	**Date Analyzed:**	12/07/21
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Solids, Total Dissolved

Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	748338

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2113925-LCS	1880	1920	98	85-115