



2024 Groundwater and Soil Vapour Monitoring Report

Red Deer Motors Site

SE 08-38-27 W4M

Red Deer, Alberta



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City of Red Deer

SEPTEMBER 18, 2025
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EXECUTIVE SUMMARY

The City of Red Deer (The City) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2024 groundwater and vapour monitoring program at a former landfill known as the Red Deer Motors (RDM) historical waste disposal site (the Site). The Site is located at Lot 3MR, Block 2, Plan 8422279 within the southeast quarter of Section 08-38-27 W4M.

The objectives of the monitoring program are to assess the environmental condition of the Site and potential impacts on the environment and adjacent receptors from potential risks related to the Site's former use as a landfill and to provide recommendations related to risk management activities at the Site. These objectives include assessing whether existing groundwater conditions at the Site meet the 2024 Alberta Environment and Protected Areas (AEPA) *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (Tier 1 Guidelines), and whether soil vapour conditions meet site-specific soil vapour screening levels.

Tetra Tech's scope of work for the 2024 monitoring and sampling program at the Site included conducting semi-annual vapour monitoring, annual groundwater sampling, annual vapour sampling, reinstalling VW-01 as 24VW-01 in 2024, and VW-04 as 25VW-04 in 2025, updating the hazard quotients, reviewing and updating previous recommendations for the Site, and preparing an annual report. Groundwater samples were collected and analyzed from monitoring wells MW-01, MW-04A, and MW-05 and a soil vapour sample was collected and analyzed from 24VW-01 in 2024 and from 25VW-04 in early 2025, following re-installation. In conjunction with the groundwater monitoring event, the adjacent Waskasoo Creek was sampled as part of the scope of work for the Red Deer College site. As the Red Deer Motors site is directly across Waskasoo Creek from the Red Deer College site, the surface water results from the Red Deer College program have been included in the Red Deer Motors monitoring report. The current groundwater monitoring network at the Site consists of six monitoring wells (MW-01, MW-02, MW-03, MW-04A, MW-04B, and MW-05). The current vapour monitoring network consists of three vapour monitoring wells (24VW-01, VW-02, and 25VW-04). The current surface water sampling network consists of two locations: SW-01 (downstream) and SW-02 (upstream).

The analytical groundwater and surface water parameters included pH, electrical conductivity (EC), major ions, total dissolved solids (TDS), nutrients, metals (dissolved for groundwater and total for surface water), benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbon (PHC) fractions F1 and F2, and volatile organic compounds (VOCs). The analytical vapour parameters included matrix gases including oxygen, carbon dioxide, methane, and nitrogen, VOCs, BTEX, and PHCs. Groundwater analytical results were compared to the standards contained in the Tier 1 Guidelines¹ and soil vapour analytical results were compared to generic soil vapour criteria developed from information contained in the Tier 1 Guidelines as well as documents by the Canadian Council of Ministers of the Environment (CCME), Health Canada, and the United States Environmental Protection Agency (US EPA).²

Based upon the results of the groundwater and vapour monitoring and sampling conducted in 2024, early 2025, and previous years, Tetra Tech has developed the following conclusions:

- The inferred groundwater flow direction, from the September 2024 elevation contours, was northwest towards Waskasoo Creek, which is consistent with previous findings.
- There is evidence of impact to groundwater by leachate, outlined below, similar to the previous results:

¹ Alberta Environment and Protected Areas (AEPA) - Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2024)

² CCME – A Protocol for the Derivation of Soil Vapour Quality Guidelines (2014); Health Canada – Toxicological Reference Values (TRVs; 2021); and US EPA – Regional Screening Levels for Chemical Contaminants (2024).

- Routine groundwater chemistry parameters and dissolved metals that exceeded the Tier 1 Guidelines at one or more monitoring wells in 2024 included TDS, chloride, sodium, and dissolved aluminum, antimony, arsenic, cadmium, copper, iron, manganese, selenium, uranium, and zinc. Exceedances for antimony, cadmium, copper, selenium and zinc at MW-04A are unusual; consequently, they are considered anomalous and will be confirmed with future sampling. The exceedance for aluminum at MW-05 is considered a filtration issue and not evidence of an environmental effect.
 - The chlorinated VOC, vinyl chloride, exceeded the Tier 1 Guideline at MW-01 and MW-05. The chlorinated VOCs cis- and trans-1,2-dichloroethene (1,2-DCE) were measured at MW-01, MW-04A (cis 1,2-DCE only), and MW-05. The measured concentrations suggest leachate has impacted the groundwater quality at MW-01, MW-04A, and MW-05. The detected VOCs are all breakdown products of the commonly used solvents trichloroethylene (TCE) and perchloroethylene (PCE). The concentrations measured in 2024 are consistent with previous results.
 - A miscommunication led to ammonia not being analyzed as part of the 2024 analytical suite of routine water quality parameters. However, given the minimal overall changes in water chemistry observed in the other parameters during the 2024 monitoring event, it is likely that the ammonia concentrations also remained relatively unchanged from those measured in the 2022 sampling event, which were below Tier 1 Guidelines and ranged from 0.103 mg/L (MW-04A) to 5.59 mg/L (MW-05).
 - The 2024 concentrations of toluene, ethylbenzene, xylenes, styrene, and PHC fractions F1 and F2 were less than the analytical detection limits at the sampled groundwater monitoring wells. Detectable concentrations of benzene less than the Tier 1 Guideline were measured at MW-01 and MW-05.
- Landfill gas (LFG) is present within the waste footprint of the Site, similar to previous results:
- Soil vapour wells 24VW-01 and 25VW-04 were re-installed following integrity issues, in September 2024 and January 2025, respectively. LFG monitoring results in December 2024 at 24VW-01, and VW-02, and in February 2025, at 25VW-04 were at low (<0.7% maximum) concentrations for methane. The soil vapour well 25VW-04 was re-installed in the immediate vicinity of VW-04 where previously methane concentrations up to 30.3% were measured, so the February 2025 results from 25VW-04 may not be representative of the elevated methane concentrations known to be present for the northeast portion of the Site. Historically, methane concentrations have also been measured at VW-01 at a maximum of 26.0% in 2013, and most recently at 0.0% in 2022.
 - The benzene concentration of 96.8 µg/m³ in the duplicate sample from 24VW-01 exceeded the soil vapour screening criteria of 41 µg/m³ derived in accordance with CCME (2014), the concentration in the primary sample was 18.8 µg/m³. The elevated benzene for the duplicate at this location appears to be an anomalous result and should be confirmed in the next sampling event. All other BTEX and PHC fractions F1 and F2 concentrations were at concentrations less than the soil vapour screening criteria.
 - The soil vapour samples collected from 24VW-01 and 25VW-04 both had a cumulative cancer risk that exceeded the cancer target risk of 1.0×10^{-5} and the cumulative hazard quotients were above the target hazard level of 1.00 at both locations. Historically, risk and hazard levels were similarly exceeded at VW-01.
 - Oil, also called free product, was observed at the bottom of soil vapour well 25VW-04. This occurrence should be confirmed in the next monitoring event, as its presence may interfere with soil vapour measurements.

Waskasoo Creek is considered a receptor of any groundwater passing through the Site. Surface water analytical results in 2024 along Waskasoo Creek suggest that the surface water quality has not been impacted by groundwater from the Site as most concentrations were higher upstream than downstream.

The results of the groundwater and vapour monitoring program in 2024 and early 2025, in combination with results from previous years, indicate there are impacts to groundwater and that vapours are being generated from the buried waste remaining in place at RDM. Therefore, ongoing risk management is required, including ongoing monitoring and administrative controls.

The following recommendations are made according to these risk management elements:

Ongoing Monitoring:

- Based on the thin soil cover identified in the earlier work by Tiamat, continue to conduct an annual basic site walkover when there is no snow cover to document any vegetation die-off and exposed soils, which may lead to potential erosion, cracking, and/or exposed wastes. This information may be used to evaluate whether vegetation cover improvements or potential repairs to the cap are necessary. During the Site walkover the condition of monitoring wells and soil vapour wells should also be verified.
- Conduct annual surface water sampling of Waskasoo Creek, both upstream and downstream of the Site, to assess potential impacts from leachate-impacted groundwater entering the creek from the Site. This sampling will be done as part of the Red Deer College monitoring and sampling program and applied to the Red Deer Motors site. The surface water sample should be analyzed for pH, EC, routine water chemistry parameters, ammonia, total metals, BTEX and PHC fractions F1 and F2 and VOCs. Consideration may be given to an additional sampling point north of 32nd Street to better assess downstream rather than cross-stream impacts, as well as any potential contributions from 32nd Street.
- Water levels at all accessible monitoring wells should continue to be monitored annually to confirm the groundwater flow pattern. Three of the wells (MW-01, MW-04A, and MW-05) should continue to be sampled for routine groundwater chemistry parameters, including ammonia, dissolved metals, BTEX, PHC fractions F1 and F2, and VOCs. As the groundwater flow pattern and groundwater quality are reasonably well defined, a reduced sampling frequency, as presented below, is suggested.
- Continued annual vapour monitoring is considered warranted to confirm conditions. The suggested monitoring schedule includes measurements of headspace pressures and LFG concentrations in the three remaining vapour wells 24VW-01, VW-02 and 25VW-04. Headspace vapour monitoring at the groundwater monitoring wells is considered to be of limited value and is not proposed for future monitoring events.
- Based on the results of the soil vapour sample from 24VW-01, and previous results at VW-04, there is a potential vapour intrusion risk in northwest and northeast portions of the Site and continued soil vapour sampling of VW-01 and 25VW-04 is recommended.
- Based on the above, the following monitoring program is proposed. If results remain consistent, reducing the monitoring and sampling frequency further over time may be warranted.

Table 1-1: Proposed Site Condition, Surface Water, Groundwater, and Vapour Monitoring Program

Activity	2025	2026	2027	2028	2029	2030
Annual (Summer) Site Walkover.	X	X	X	X	X	X
Annual (Summer) Surface water sampling of Waskasoo Creek (Upgradient and Downgradient).	X	X	X	X	X	X
Annual (Summer) Groundwater Monitoring of Water Levels at All Accessible Monitoring Wells and Sampling of Three Monitoring Wells (MW-01, MW-04A, and MW-05).		X			X	
Annual (Winter) Vapour Monitoring at 24VW-01, VW-02 and 25VW-04 and Vapour Sampling at 24VW-01 and 25VW-04.	X	X	X	X	X	X

The proposed monitoring program is to be reviewed on an annual basis as new information becomes available.

Administrative Actions:

- Utilize the revised generic mitigative measures as a guide when evaluating applications for sensitive development within the setback.
- Ensure that the Site is clearly identified within The City's Zoning Bylaw 3357/2024 and appropriate administrative requirements are met for the Site in accordance with City policies. If changes to the land use are identified, recommend measures be taken to protect users.
- Ensure that the Site is clearly identified within The City's utility mapping system. Elevated gas concentrations are present in the subsurface proximate to the corner of 32nd Street and Taylor Drive. Future activities in this vicinity (e.g., utility work, repairs, paving) should consider the potential presence of gas and a site-specific safety plan should be developed for work undertaken to limit the potential for exposure to site workers.
- The City should review the Site condition on an ongoing basis to ensure that the cover remains intact and drainage remains positive. Repairs or maintenance should be undertaken as required to maintain the Site.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of The City of Red Deer and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than The City of Red Deer, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in Appendix A or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

The City of Red Deer (The City) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2024 groundwater and vapour monitoring program at a former landfill located known as the Red Deer Motors (RDM) historical waste disposal site (the Site). The Site is located at Plan 0020018, Block 2, Lot 6 MR and Plan 9422275 Block 0 Lot 7 MR within the southeast quarter of Section 08-38-27 W4M.

The objectives of the monitoring program are:

- to assess the environmental condition of the Site;
- evaluate potential impacts on the environment and adjacent receptors related to the Site's former use as a landfill; and
- provide recommendations for risk management activities.

The scope for 2024 presented in Section 1.1 was based on recommendations from Tetra Tech's 2022 and 2023 groundwater and soil vapour monitoring and sampling program conducted at the Site. Those results were presented and discussed in the 2022 and 2023 Groundwater and Soil Vapour Monitoring Report – Red Deer Motors Site (Tetra Tech 2024a).

The field components of the monitoring program were completed using Tetra Tech's detailed work plans encompassing the scope of work outlined in Section 1.1 below. The current report was completed under Tetra Tech's Limitations on the Use of this Document for conducting environmental work. A copy of these conditions is provided in Appendix A.

1.1 Scope of Work

Based on the 2022 and 2023 findings and recommendations, the work conducted in 2024 included the following:

- Two annual vapour monitoring events, including measuring headspace vapours and groundwater levels within each vapour monitoring well and observing monitoring well integrity. The second event was completed to monitor the re-installed VW-04 (renamed 25VW-04) that had been found destroyed during the initial monitoring event.
- Two vapour sampling events, by collecting a vapour sample into a Summa canister for analysis from 24VW-01 in December 2024 and later from 25VW-04 in February 2025.
- An annual groundwater monitoring event in September 2024 at three monitoring wells, including measuring methane concentrations in headspace vapours and groundwater levels within each groundwater monitoring well and observing monitoring well integrity.
- One groundwater sampling event in September 2024 at three monitoring wells (MW-01, MW-04A, and MW-05). Field measurements for electrical conductivity (EC), pH, and temperature were recorded at the time of sampling. The samples were submitted for laboratory chemical analyses. As per the recommendation in the 2021 report, monitoring well MW-02 has been excluded from the sampling program since 2021 and was not monitored or sampled in 2024.
- In conjunction with the groundwater monitoring event, the adjacent Waskasoo Creek was sampled as part of the scope of work for the Red Deer College site. As the Red Deer Motors site is directly across Waskasoo Creek from the Red Deer College site, the surface water results from the Red Deer College program have been included in the Red Deer Motors monitoring report. Sampling was intended to assess potential impacts from the Site on Waskasoo Creek. Sampling was carried out at one up-gradient (SW-02) and one down-gradient

(SW-01) location, and the surface water samples were submitted for the same suite of parameters as the groundwater samples. However, metals were analyzed as total metals in unfiltered samples.

- Collection of one duplicate groundwater and one duplicate soil vapour sample for quality assurance/quality control (QA/QC) purposes.
- Monitoring well repairs, as required.
- Completion of a site walkover during each monitoring event to evaluate the cover for potential erosion, cracking, and/or exposed wastes.
- Preparation of an annual report summarizing the field activities, interpreting the groundwater, surface water, and soil vapour analytical results and providing recommendations for future monitoring activities at the Site.

2.0 BACKGROUND INFORMATION

2.1 General Information

The Site is located within SE 08-38-27 W4M, at Plan 0020018, Block 2, Lot 6 MR and Plan 9422275 Block 0 Lot 7 MR. The Site location is shown on Figure 1. The Site is zoned A2 – Environmental Preservation Zone and is across Taylor Drive from Red Deer Polytechnic. The Site is located immediately east of Waskasoo Creek, south of 32nd Street and south and west of commercial buildings. A site plan is shown on Figure 2. The Site is undeveloped and consists of natural areas including, grasses, trees, and shrubs with power lines extending north to south on the west side. Additional information on the Site history, historical groundwater monitoring investigations, geology and hydrogeology can be found in Appendix B. Cross-sections prepared by Tiamat Environmental Consultants Ltd. (Tiamat, 2014) using the wells previously installed at the Site in 2013 are included in Appendix C. Borehole logs from 2013, 2021, and 2024 are included in Appendix F.

2.2 Conceptual Site Model Summary

The selection of comparative guidelines is based on the conceptual site model (CSM) first described in the 2021 groundwater and soil vapour monitoring report (Tetra Tech 2022a), and updated in the 2022 and 2023 groundwater and soil vapour monitoring report (Tetra Tech 2024a). The CSM outlines the rationale for the selection of applicable exposure pathways and receptors at the Site, based on guidance from the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Alberta Environment and Parks [AEP] 2022), as amended in 2024 by Alberta Environment and Protected Areas (AEPA). The CSM included the following items:

- Description of any identified environmental issues including a description of processes or activities undertaken at or near the Site and a listing of contaminants of potential concern (COPCs) identified in earlier investigations.
- Description of known and reported historical releases, including locations and status of any subsequent environmental site assessments (ESAs) and remediation.
- Identification of applicable exposure pathways and receptors.

The following table presents a summary of the relevant receptors and exposure pathways identified in the CSM.

Table 2-1: Summary of Conceptual Site Model

Release Mechanism	COPC	Migration Pathway	Potential Receptor
Leachate infiltration into foundation soils or seepage through cover.	Inorganic parameters and nutrients, metals, petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile organic compounds (VOCs), and other indicator parameters (i.e., biological oxygen demand [BOD] and chemical oxygen demand [COD]).	Direct soil contact.	Human users of the parkland; ecological plants and soil invertebrates.
		Migration to groundwater users via water wells; migration to Waskasoo Creek via groundwater or surface seeps.	Domestic use aquifer (DUA) drinking water; freshwater aquatic life (FAL) in Waskasoo Creek.
		Nutrient and energy cycling.	Microbial functioning of the soil.
Landfill gas (LFG) emissions.	VOCs, methane, BTEX, PHC fractions, and siloxanes.	Vapour inhalation; vapour intrusion to confined spaces.	Human users of the parkland; inhabitants of buildings near the parkland; workers in excavations/trenches.

2.2.1 Data Evaluation

To establish the appropriate guidelines for the Site, residential land use criteria were used. The receptors were determined by a combination of the degree of potential exposure, the exposure pathway, and the contaminants of concern. Human receptor exposures applicable to the Site include the direct soil contact, FAL, and inhalation pathways. The ecological receptor exposures applicable to the Site include direct soil contact and nutrient and energy cycling. Through previous investigations, Tetra Tech has determined that the dominant soil stratigraphy governing potential contaminant transport at the Site is coarse grained.

As recommended by AEP, the soil vapour results obtained during investigation were compared to the Canadian Council of Minister of the Environment’s (CCME’s) document A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures Via Inhalation of Vapours (CCME 2014). To determine the appropriate guidelines for comparison of the vapour sampling results, indoor air risk calculations were carried out and methane explosive risks were evaluated.

Based on the CSM, the most applicable guidelines for groundwater, surface water, and vapour results for the Site included the following:

- Groundwater concentrations at the Site were compared to the Tier 1 Guidelines (AEPA 2024a) under residential and parkland land uses for coarse-grained soils with the FAL pathway included.
- Surface water analytical results were compared to the most conservative values for the protection of FAL as set out in the AEP document Environmental Quality Guidelines for Alberta Surface Waters (AEP 2018). Additional surface water sampling was carried out in 2024 in order to assess potential impacts from the Site on Waskasoo Creek. Surface water quality results for the two 2021 sampling events, along with the 2024 results are included in Table 4.
- Soil vapour analytical results were compared to soil vapour screening criteria under residential land use for both slab-on-grade and basement for coarse-grained soils, developed from the CCME document. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures Via Inhalation of Vapours (CCME 2014). Soil vapour screening criteria for vapour intrusion into indoor air spaces were updated as of 2023, using current toxicity reference values (TRVs) from Health Canada and the United States Environmental Protection Agency (US EPA).

- Cumulative target risk and hazard levels for the hazard quotient evaluation were determined in accordance with Alberta Tier 2 Guidelines (Tier 2 A EPA 2024b). For carcinogens, the target risk level is 1×10^{-5} , as this value is considered by Health Canada to represent a negligible risk. This risk level applies to both individual compounds and a summation (i.e., cumulative) of individual compounds risks. For non-carcinogens, a cumulative target hazard level of 1.0 is used as potential exposures that result in cumulative hazard indices equal to or less than 1.0 signify negligible potential for adverse health effects. For individual compounds, a hazard index of 0.2 was used. Each sampling location was screened individually for every chemical detected, and the results evaluated relative to both individual and cumulative risks and hazard levels. For some compounds, both carcinogenic and non-carcinogenic effects required calculation.

2.3 Monitoring Well Network

The groundwater monitoring network at the Site consists of six monitoring wells (MW-01, MW-02, MW-03, MW-04A, MW-04B, and MW-05). Monitoring wells MW-04A, MW-04B, and MW-05 were presumably installed by Alberta Environmental Protection in the 1980s and completion details for these three wells are not known.

The current vapour monitoring network consists of three vapour monitoring wells (24VW-01, VW-02, and 25VW-04). The original vapour monitoring wells (VW-01, VW-02, and VW-03) were installed in 2013 as part of the Phase II ESA. VW-03 which was located at the northeast corner of the Site, was likely destroyed during the development of the parking lot on the property directly east of the Site. VW-01 was reinstalled as 24VW-01 in 2024, and VW-04 was reinstalled as 25VW-04 in 2025.

Groundwater and vapour monitoring well locations are shown on Figure 2. Borehole logs for both groundwater and soil vapour monitoring wells are presented in Appendix F.

3.0 FIELD MONITORING AND SAMPLING METHODOLOGY

A discussion of the methods used for the fieldwork and laboratory testing is presented in the following sections.

3.1 Groundwater Monitoring and Sampling

Tetra Tech conducted groundwater monitoring and sampling on September 6, 2024.

Groundwater monitoring consisted of measuring static groundwater levels in each monitoring well using an interface meter.

The methodology for groundwater monitoring and sampling included the following:

- Observing the integrity of each well and noting drainage and site conditions near the well that may have an effect on monitoring results or groundwater quality.
- Measuring standing water levels in each monitoring well with an air-oil-water interface probe, recording total well depths, and confirming absence of non-aqueous phase liquids (NAPLs).
- Recording of field data on standardized forms as documented in Tetra Tech standard operating practices.
- Purging each monitoring well requiring sampling of at least three well volumes of water, or until the well was practically dry, using dedicated polyethylene bailers or Waterra tubing with inertial pump foot valves.

Following the completion of groundwater monitoring and purging, groundwater samples were collected from the required wells using the procedures identified below:

- Groundwater samples were collected from three monitoring wells (MW-01, MW-04A, and MW-05). Samples were collected into appropriate laboratory supplied, sterile glass and plastic vials and bottles for the required analytical package. Samples were filtered and/or preserved in the field, as required.
- Field measurements were taken for pH, EC, and temperature at the time of sampling.
- Samples were submitted in coolers with ice to the ALS Laboratory Group (ALS) in Calgary, Alberta for laboratory analysis under chain-of-custody (COC) documentation.

3.1.1 Groundwater Analytical Program

The analytical program for the groundwater monitoring wells was developed based on the recommendations in Section 1.1, and is summarized below:

- Routine water chemistry.
- Ammonia.
- Dissolved metals.
- BTEX and PHC fractions F1 and F2.
- VOCs.

A miscommunication led to ammonia not being analyzed as part of the 2024 analytical suite of routine water quality parameters.

3.2 Surface Water Sampling

Tetra Tech conducted surface water sampling on September 7, 2024, at Waskasoo Creek.

Surface water samples were collected at two locations along Waskasoo Creek: upstream (SW-02) and cross-gradient/downstream (SW-01) of the Site. Surface water sampling locations are presented on Figure 2.

The methodology for surface water sampling included the following:

- Observing the flow and water level of Waskasoo Creek prior to sampling.
- Surface water samples were collected by submerging the sampling bottle halfway between the water surface and the bottom of the creek bed, with the mouth of the bottle facing upstream.
- Samples were collected into appropriate laboratory supplied, sterile glass and plastic vials and bottles for the required analytical package. Samples were preserved in the field, as required.
- Field measurements were taken for pH, EC, and temperature at the time of sampling.
- Samples were submitted in iced coolers to ALS in Calgary, Alberta for laboratory analysis under COC documentation.

3.2.1 Surface Water Analytical Program

The analytical program for the surface water sampling locations is summarized below:

- Routine water chemistry.

- Ammonia.
- Total metals.
- BTEX and PHC fractions F1 and F2.
- VOCs.

A miscommunication led to ammonia not being analyzed as part of the 2024 analytical suite of routine water quality parameters.

3.3 Vapour Field Program

Tetra Tech conducted soil vapour monitoring and sampling on December 3, 2024 (24VW-01), and February 26, 2025 (25VW-04), from the soil vapour wells and methane was measured from the groundwater monitoring well headspaces on September 6, 2024.

Measurements were taken of the methane headspace concentrations in each groundwater well using a calibrated RKI Eagle Hydrocarbon Surveyor II (RKI Eagle).

Soil vapour well VW-01, located within the northwest corner of the Site near monitoring well MW-01, was considered to have been compromised, the casing possibly having been damaged by frost heave, allowing the ingress of surface water. On September 4, 2024, Tetra Tech re-installed the well, renamed as 24VW-01, to a depth of 3.5 m with a 0.3 m screen interval.

Soil vapour well VW-03, located at the northeast corner of the Site, was likely destroyed during the parking lot development east of the Site and was replaced by VW-04 in 2021. VW-04 was placed further south, close to MW-02 and MW-03 (Figure 2) in order to monitor the presence of landfill gas close to the on-Site buildings at the commercial properties to the east of the Site. Well VW-04 was reinstalled on December 8, 2022, as it was found to have initially been blinded—that is, the screen being below the shallow water table. On December 3, 2024, during the monitoring event, VW-04 was found to be unserviceable as the cap and protective cover were missing, and the well had been partially filled with soil. On January 15, 2025, Tetra Tech re-installed VW-04, renamed as 25VW-04, to a depth of 2.50 m with a 1.50 m screen interval.

Soil vapour well VW-02 is located in the southern portion of the Site. It has been monitored annually but not sampled since 2019 due to consistently low methane measurements.

Each soil vapour probe was inspected for visible signs of damage and the position of the sampling labcock was noted. Soil gas pressure was recorded using a digital manometer. Once the soil gas pressure measurement was recorded, the soil gas probe was purged of three well volumes of air. The soil vapour probes were purged directly with a CES-Landtec GEM 5000 (GEM) Landfill Gas (LFG) analyzer.

After purging, gas composition measurements were recorded using GEM LFG analyzer. After recording soil gas concentrations (methane, carbon dioxide, oxygen, hydrogen sulphide, and balance gas) on a percent volumetric basis, the probe/well depths and water levels (if present) were measured and recorded to confirm the water level within the probe was beneath the screen portion of the soil gas well (i.e., the well was not blinded).

A leak detection test was completed to ensure the vapour probe was sealed properly. The test was completed using a helium gas tracer to inspect the testing probe and apparatus for any leaks. If there was a leak beyond the acceptable range of 2% of helium concentration, the connections were tightened, and the leak test was conducted again.

Sampling of the soil vapour wells was based on the methodology of the CCME sampling guidelines (CCME 2016a, 2016b), and is summarized as follows:

- Prior to collecting the soil vapour well samples, the well was purged of three well volumes, or until headspace readings stabilized.
- A 1.4 L Summa vacuum canister was used for sample collection at the soil vapour probe monitoring location.
- Sample data was recorded on the provided sample tag for each canister.
- Sample tubing that was used to connect the canister to the soil vapour well was low in VOCs and only used once to prevent sample contamination.
- When beginning sample collection, the end cap was removed, and a 60-minute flow controller was attached to the canister. Start time and starting pressure were recorded on the sample tag.
- When sampling was complete, the valve was closed, and the flow controller was removed. The end time and final pressure were recorded on the sample tag.
- The protective end cap was replaced back on the canister.
- Canisters, flow controllers, and pressure gauges were placed in the original shipping container and returned to the laboratory under COC documentation.
- The soil vapour probe sampling port was returned to the closed position, and the well was securely locked.

The vapour samples were transferred to ALS for chemical analyses.

A duplicate sample was collected from 24VW-01 during the vapour sampling event for QA/QC purposes.

3.3.1 Vapour Well Analytical Program

The analytical program for soil vapour is summarized below:

- VOCs.
- Matrix gases including oxygen, carbon dioxide, carbon monoxide, methane, and nitrogen.
- BTEX and PHCs.
- Naphthalene.

4.0 RESULTS AND DISCUSSION

This section presents the results of the fieldwork conducted in 2024 and early 2025 at the Site and discussions of these results.

4.1 Groundwater Well Headspace Monitoring

Tetra Tech monitored six groundwater monitoring wells (MW-01, MW-02, MW-03, MW-04A, MW-04B, and MW-05) during each monitoring event for measurements of methane in well headspace using a LandGEM LFG analyzer. The LandGEM LFG analyzer detection limit ranges from 5 parts per million (ppm) to 100% of the lower explosive

limit (LEL). For methane, the LEL is 5% by volume in air, or 50,000 ppm. Thus, 500 ppm is equivalent to 1% LEL, and 20% LEL is equivalent to 1% gas.

During the September 2024 monitoring event, groundwater monitoring well headspace methane concentrations were non-detect at all monitoring wells. The methane headspace concentrations for 2024 are presented in Table 1.

4.2 Groundwater Elevations

The measured groundwater levels and calculated groundwater elevations for 2024 are presented in Table 1.

Figure 3 presents the groundwater elevation trends (hydrographs) for the groundwater monitoring wells for the years 2013 to 2024. The groundwater elevations in 2024 were similar to the historically measured elevations.

The average depth to groundwater in September 2024, was 2.96 mbg, a slight increase from the December 2022 average of 2.92 mbg.

The groundwater elevations and interpreted elevation contours for September 2024 for the groundwater monitoring wells are shown on Figure 4. The inferred groundwater flow direction was to the northwest towards Waskasoo Creek, consistent with previous contour maps.

The average horizontal gradient in September 2024, was approximately 0.04 m/m.

4.3 Groundwater Field Parameters

Field measurements for temperature, pH, and EC in September 2024 are shown in Table 2. A discussion of the results of the field tests is summarized in this section.

Groundwater temperatures ranged from 8.7°C (MW-01) to 9.1°C (MW-05). The field parameters for MW-04A were not collected as there was insufficient water.

Field pH values ranged from 6.62 (MW-01) to 6.65 (MW-05). Field pH differed slightly from laboratory pH at all monitoring wells. The difference between field recorded and laboratory pH values may be due to limitations of the field equipment, differences in sample temperature, and the chemical changes that can occur in an unpreserved sample.

Field EC measurements ranged from 2,530 $\mu\text{S}/\text{cm}$ (MW-05) to 2,680 $\mu\text{S}/\text{cm}$ (MW-01). Field EC results were comparable to laboratory-measured EC results.

4.4 Groundwater Analytical Results

The groundwater analytical data for 2024 is summarized in Table 2. The 2024 laboratory analytical reports are included in Appendix D and historical analytical tables, reproduced from the Tiamat *Phase II Environmental Site Assessment* (2014) are included in Appendix E.

4.4.1 Background Groundwater Quality

Monitoring well MW-02 is located on the hydraulically up-gradient portion of the Site and has been designated as representing background conditions for the Site. MW-02 was sampled in August 2013 by Tiamat (2014) and November 2021 by Tetra Tech (2022). The 2013 results are presented in Appendix E and the 2021 results are presented in Table 2.

The 2021 concentration of dissolved manganese at MW-02 was 1.48 mg/L, exceeding the Tier 1 Guideline of 0.05 mg/L. The concentration of dissolved manganese may be related to natural groundwater quality. The concentration of dissolved iron was less than the analytical detection limit of 0.3 mg/L, and less than all other concentrations measured in 2021. The concentration of chloride was 54.1 mg/L, and the concentration of sodium was 16.7 mg/L, which are an order of magnitude less than most wells at the Site in 2021, 2022, and 2024. Concentrations of BTEX, PHC fractions F1 and F2, and VOCs were all less than the analytical detection limits.

The groundwater analytical results for MW-02 in 2021 were similar to the 2013 results and did not suggest groundwater quality impacts related to municipal solid waste (MSW) landfill leachate at this location.

4.4.2 Routine Water Chemistry Parameters

The 2024 total dissolved solids (TDS) concentrations ranged from 1,460 mg/L (MW-01, Duplicate) to 1,740 mg/L (MW-04A). TDS concentrations were similar to the concentrations measured previously and all monitoring wells exceeded the Tier 1 Guideline of 500 mg/L. Elevated TDS concentrations often occur in groundwater as a result of the dissolution of naturally occurring salts and minerals in Alberta, and do not necessarily indicate groundwater quality impact related to buried wastes.

Chloride is often considered a useful parameter to assess groundwater quality impacts associated with landfills, as chloride is often present in elevated concentrations in leachate, and due to the mobile and conservative (non-reactive) nature of the ion. The 2024 chloride concentrations ranged from 207 mg/L at MW-05 to 463 mg/L at MW-01 (Duplicate). Concentrations of chloride exceeded the Tier 1 Guideline of 120 mg/L at MW-01 (463 mg/L, Duplicate; 460 mg/L, primary sample), MW-04A (315 mg/L), and MW-05 (207 mg/L) and were similar to previous results.

The 2024 sodium concentrations exceeded the Tier 1 Guideline of 200 mg/L at monitoring wells MW-01 (217 mg/L, Duplicate; 214 mg/L, primary sample) and MW-04A (269 mg/L). The sodium concentration at MW-05 was 183 mg/L and less than the Tier 1 Guideline.

A miscommunication led to ammonia not being analyzed as part of the 2024 analytical suite of routine water quality parameters. However, given the relatively limited overall changes in water chemistry observed in the other parameters during the 2024 monitoring event, it is likely that the ammonia concentrations also remained relatively unchanged. Previously, the highest ammonia concentrations were reported at 7.2 mg/L at MW-01 and 7.1 mg/L at MW-05 in 2019; this is above the Tier 1 Guideline. The 2022 ammonia concentrations were below the Tier 1 Guideline in MW-04A, marginally exceeded the Tier 1 Guideline at MW-01, and exceeded the Tier 1 Guideline at MW-05 with a maximum concentration of 5.59 mg/L.

4.4.3 Dissolved Metals

Dissolved aluminum concentrations exceeded the Tier 1 Guideline of 0.05 mg/L at MW-05 (0.0641 mg/L) and were below the Tier 1 Guideline at MW-01 (non-detect) and MW-04A (0.0037 mg/L).

Dissolved antimony concentrations exceeded the Tier 1 Guideline of 0.006 mg/L at MW-04A (0.00952 mg/L) and were below the Tier 1 Guideline at MW-01 (non-detect) and MW-05 (0.00023 mg/L).

Dissolved arsenic concentrations exceeded the Tier 1 Guideline of 0.005 mg/L at MW-01 (0.0228 mg/L, primary sample; 0.0232 mg/L, duplicate), and at MW-05 (0.00864 mg/L). Monitoring well MW-04A was below the Tier 1 Guideline (0.00425 mg/L). Arsenic is known to be strongly adsorbed onto iron (hydr)oxides, and when these minerals dissolve, arsenic will also go into solution (Hem 1992). The concentrations of arsenic are likely correlated to the presence of dissolved iron and anoxic conditions due to leachate impacts.

Dissolved cadmium concentrations exceeded the Tier 1 Guideline of 0.00037 mg/L at MW-04A (0.00194 mg/L) and were below the Tier 1 Guideline at MW-01 (non-detect) and MW-05 (0.0000706 mg/L).

Dissolved copper concentrations exceeded the Tier 1 Guideline of 0.007 mg/L at MW-04A (0.154 mg/L) and were below the Tier 1 Guideline at MW-01 (non-detect) and MW-05 (0.00250 mg/L). The measured copper concentration cannot be explained based on other changes in groundwater chemistry and is considered anomalous.

Dissolved iron and manganese are redox-sensitive parameters that naturally occur in groundwater under anoxic conditions and can help determine whether the groundwater quality is affected by biodegradation reactions, for instance related to landfill leachate. Dissolved iron concentrations exceeded the Tier 1 Guideline of 0.3 mg/L at MW-01 (25.3 mg/L, primary; 25.4 mg/L, duplicate), and at MW05 (6.93 mg/L). MW-04A was below the analytical detection limit and the Tier 1 Guideline, which is a significant change from previous results and similar to the measured copper concentration in the sample, may be anomalous. Dissolved manganese concentrations exceeded the Tier 1 Guideline of 0.02 mg/L at MW-01 (1.86 mg/L, primary; 1.94 mg/L, duplicate), MW-04A (0.481 mg/L) and MW-05 (1.91 mg/L).

Dissolved selenium concentrations exceeded the Tier 1 Guideline of 0.002 mg/L at MW-04A (0.00298 mg/L) and were below the Tier 1 Guideline at MW-01 (0.000116 mg/L, primary; 0.000106 mg/L, duplicate), and MW-05 (0.000193 mg/L). Selenium may be naturally occurring and is not necessarily related to the closed landfill.

The dissolved uranium concentrations exceeded the Tier 1 Guideline of 0.015 mg/L at MW-04A (0.0918 mg/L) and were below the Tier 1 Guideline at MW-01 (0.00287 mg/L, primary; 0.00279 mg/L, duplicate) and MW-05 (0.0122 mg/L). Uranium may be naturally occurring and is not necessarily related to the closed landfill.

The dissolved zinc concentrations exceeded the Tier 1 Guideline of 0.03 mg/L at MW-04A (0.0386 mg/L) and were below the Tier 1 Guideline at MW-01 (non-detect, primary; 0.0027 mg/L, duplicate) at and MW-05 (0.0056 mg/L). As zinc was an order of magnitude less in previous sampling events, similar to copper and iron, the concentration measured in 2024 may have been anomalous.

Other than the parameters noted above, the 2024 dissolved metals concentrations were consistent with historical results.

4.4.4 Organic Parameters

Benzene was detected at concentrations below the Tier 1 Guideline of 0.005 mg/L at MW-01 (0.00242 mg/L, primary; 0.00221 mg/L, duplicate) and MW-05 (0.00184 mg/L). Concentrations of toluene, ethylbenzene, xylenes, styrene, and PHC fractions F1 to F2 were less than the analytical detection limits at monitoring wells MW-01, MW-04A, and MW-05.

Concentrations of vinyl chloride exceeded the Tier 1 Guideline of 0.0011 mg/L at MW-01 (0.0061 mg/L, primary sample; 0.0043 mg/L, duplicate) and MW-05 (0.0098 mg/L). The vinyl chloride concentration was non-detect at MW-04A.

The two monitoring wells that had exceedances for vinyl chloride also had detectable concentrations of other (chlorinated) VOCs for which Tier 1 Guidelines have not been established. These chlorinated VOCs were cis and trans isomers of 1,2-dichloroethene (1,2-DCE). Cis-1,2-DCE was also detected at MW-04A. Vinyl chloride and 1,2-DCE are breakdown products of the solvents trichloroethylene (TCE) and perchloroethylene (PCE), commonly used in dry-cleaning and are often present in MSW leachate.

The organics concentrations were consistent with historical results.

4.5 Surface Water Field Parameters and Analytical Results

The 2024 surface water field parameters and analytical data are presented in Table 4. The 2024 laboratory analytical reports are included in Appendix E.

Surface water field parameters were as follows:

- Temperatures ranged from 18.7°C (SW-02) to 20.5°C (SW-01).
- The pH values ranged from 7.84 (SW-02) to 8.14 (SW-01). Field pH measurements were lower than the laboratory pH at both monitoring locations.
- EC measurements ranged from 1,038 µS/cm (SW-01) to 1,318 µS/cm (SW-02). Field EC results were higher than the laboratory measured EC results at both monitoring locations.

The chloride concentration at the upstream (SW-02) surface water location was 141 mg/L, which exceeds the Tier 1 Guideline of 120 mg/L. The downstream (SW-01) chloride concentration was below the Tier 1 Guideline. It is not uncommon to have elevated chloride concentrations in an urban setting due to the use of road salt and other anthropogenic sources. Because the upstream location had a higher concentration than downstream, the reported chloride at SW-01 is not interpreted to be related to leachate impacts.

Nitrate concentrations were less than the Tier 1 Guideline at SW-01 and SW-02, and were non-detect for nitrite.

Alkalinity has exceeded the Guideline of 20 mg/L for both upstream and downstream samples for each sampling event (2021, 2022 and 2024).

Total aluminum, iron and zinc concentrations exceeded their respective Tier 1 Guidelines of 0.05 mg/L, 0.3 mg/L and 0.03 mg/L at the upstream (SW-02) surface water location, consistent with previous results. Aluminum and iron are naturally present in clay, and suspended solids were likely present in the total metals sample. In addition, aluminum, iron, and zinc were higher at the upstream location; this shows no sign of impact from total metals leaving the Site. Consequently, it is unlikely that the results are related to leachate or buried waste.

BTEX, PHC fractions F1 and F2, and VOCs were less than the analytical detection limits at both surface water locations. This is consistent with previous results.

Surface water analytical results for samples collected in 2024 from upstream and downstream locations along Waskasoo Creek do not suggest water quality impacts from the buried waste onsite. The water quality upstream and downstream of the Site is similar, with upstream results having higher chloride and total metals concentrations.

4.6 Soil Vapour Monitoring Results

The soil vapour monitoring results are presented in Table 5.

Pressures at all vapour wells were negligible during the December 2024 and February 2025 monitoring events.

LFG monitoring results in December 2024 at 24VW-01 and VW-02, and in February 2025 at 25VW-04 were less than or equal to 0.7% for methane; this is outside the explosive range for methane (5% LEL to 15% upper explosive limit (UEL)). Carbon dioxide was elevated at 25VW-04 at 7% and oxygen was 12.7% in February 2025. Percentages of oxygen and carbon dioxide at 24VW-01 and VW-02 were similar to the normal atmospheric percentages of 21% for oxygen and 0.04% for carbon dioxide.

Concentrations of methane were non-detect at VW-02 and 0.5% at 24VW-01 in December 2024. VW-04 was found to have been damaged beyond repair in December 2024 and after re-installation was monitored in February 2025, as 24VW-04. The methane concentration at 24VW-04 in February 2025 was 0.7%. Wells 24VW-01 and 25VW-04 are located within the waste footprint.

The soil vapour well 25VW-04 was re-installed in the immediate vicinity of VW-04 where previously methane concentrations up to 30.3% were measured, so the February 2025 results from 25VW-04 may not be representative of the elevated methane concentrations known to be present for the northeast portion of the Site. Historically, methane concentrations were also measured at VW-01 at a maximum of 26.0% in 2013 and most recently at 0.0% in 2022.

During the February 2025 monitoring event, oil was observed at the bottom of soil vapour well 25VW-04. This occurrence should be confirmed in the next monitoring event, as the presence of free product may interfere with soil vapour measurements.

4.7 Soil Vapour Analytical Results

Table 6 summarizes the soil vapour analytical results collected for December 2024 from 24VW-01, and February 2025 from 25VW-04, along with historical analytical results, and compares them to the generic soil vapour screening criteria calculated using information from Tier 1 (AEPA, 2024a), Health Canada (2021), United States Environmental Protection Agency (US EPA; 2024), and CCME (2014). The 2024 and 2025 laboratory analytical reports are included in Appendix D.

BTEX and PHC fractions F1 and F2 (parameters with a TRV for inhalation) were compared against the screening criteria for residential land use, coarse-grained soil. The soil vapour analytical results for 24VW-01 and 25VW-04 had measurable concentrations of these contaminants, mostly at concentrations less than the soil vapour screening criteria. The benzene concentration in the duplicate sample at 24VW-01 ($96.8 \mu\text{g}/\text{m}^3$) exceeded the soil vapour screening criteria of $41 \mu\text{g}/\text{m}^3$ derived in accordance with CCME (2014); the primary result was $18.8 \mu\text{g}/\text{m}^3$. The elevated benzene for the duplicate at this location appears to be an anomalous result and should be confirmed in the next sampling event.

Naphthalene was detected at 24VW-01 ($4.14 \mu\text{g}/\text{m}^3$; $4.46 \mu\text{g}/\text{m}^3$ at the duplicate) and 25VW-04 ($6.24 \mu\text{g}/\text{m}^3$); these values are below the Guideline of $380 \mu\text{g}/\text{m}^3$.

VOCs (parameters with a TRV for inhalation) were compared against the screening criteria for residential land use, coarse-grained soil. Several VOC parameters were detected in the soil vapour samples from 24VW-01 and 25VW-04. The measured concentrations were below the screening criteria.

The methane concentrations in the soil vapour samples at 24VW-01 (1.78% at the duplicate) and 25VW-04 (0.648%) were similar to the field measured values (0.5% and 0.7%, respectively) and were below the LEL for methane.

4.8 Quality Assurance/Quality Control

4.8.1 Methods

Tetra Tech's QA/QC procedures include reviewing the data collected for precision and accuracy and following the appropriate field protocols.

The field procedures for QA/QC involved:

- Changing nitrile gloves between sample collections;
- Using sample containers provided by the laboratory;
- Cleaning monitoring and sampling tools between sample locations;
- Filling sample containers for PHC analysis with no headspace (air) when the containers were closed;
- Collecting a duplicate groundwater and soil vapour sample during the sampling program;
- Conducting leak testing at vapour wells prior to the collection of vapour samples; and
- Documenting field procedures and sampling activities.

4.8.2 Results

The groundwater and soil vapour QA/QC results are included in Table 3 and Table 7. The duplicate sample for groundwater was taken at monitoring well MW-01 and the duplicate sample for LFG was taken at vapour well VW-01. The duplicate samples were submitted for analysis of the same parameters as the primary sample.

The duplicate results are compared by relative percent difference (RPD). The RPD is calculated using the following equation:

$$RPD = \left[\frac{(V_1 - V_2)}{\frac{(V_1 + V_2)}{2}} \right] * 100\%$$

Where:

V_1 = Parent Sample.

V_2 = Duplicate Sample.

Chemical parameters were considered as having passed the QA/QC reproducibility procedure if the RPD was less than or equal to 20%, indicating a close correlation between the sample-duplicate pair.

RPD values were not calculated if one or both of the sample-duplicate concentrations were between the reportable detection limit (RDL) and five times the RDL. In these cases, chemical parameters were still considered as having passed the QA/QC reproducibility procedure if the sample-duplicate concentration difference was less than one RDL value.

RPDs for vinyl chloride in groundwater and benzene, toluene, ethylbenzene, styrene, and total BTEX in LFG exceeded the accepted limit of 20% for groundwater and 50% for soil vapour. The concentrations of the aforementioned parameters are very low and all but benzene in the duplicate sample for LFG were far below their respective guidelines. However, when concentrations are this low, even minor differences in concentration will produce a large RPD. All concentrations but benzene in the duplicate were below their respective guidelines, so interpretation is not affected. The concentration of benzene in the duplicate sample is approximately twice that of the guideline and should be considered representative in interpretation of the results. Based on this assessment, the sample methods and results are considered acceptable.

5.0 HAZARD QUOTIENT RESULTS

Soil vapour well 25VW-04 is located on the northeastern portion of the Site, approximately 240 m from the nearest residential building and approximately 60 m from the nearest commercial building. The vapour well replaces former VW-03 and the rationale for siting the well here was the relative proximity of commercial buildings east of the vapour well.

Soil vapour well 24VW-01 is located in the northwest corner of the Site and is bounded by roads on the north and west. It is approximately 315 m from the nearest residential building and approximately 80 m from the nearest commercial building. The rationale for siting the well here was that utility corridors are present along the road rights-of-way, which could be a preferential pathway for the soil vapour.

Soil vapour well VW-02 is located in the southeastern portion of the Site approximately 100 m from the nearest commercial building to the east and approximately 150 m from the Northland Apartments to the south-east. This well was positioned at this location to monitor LFG that has the potential to migrate towards the commercial and residential buildings, and due to the location of a buried stormwater line in the area.

Using the soil vapour screening levels and calculations described in the 2022 and 2023 groundwater and soil vapour monitoring report (Tetra Tech 2024a), the soil vapour sampling results, estimated cancer risks (for carcinogens), and estimated hazard quotients (for non-carcinogens) were calculated for the Site.

Cumulative target risk and hazard levels were determined in accordance with 2024 AEPA *Alberta Tier 2 Soil and Groundwater Remediation Guidelines* (Tier 2 Guidelines). For carcinogens, the target risk level is 1×10^{-5} , as this

value is considered by Health Canada to represent a negligible risk. This risk level applies to both individual compounds and a summation (i.e., cumulative) of individual compound risks. For non-carcinogens a cumulative target hazard level of 1.0 is used as potential exposures that result in cumulative hazard indices equal to or less than 1.0 signify negligible potential for adverse health effects. For individual compounds, a hazard index of 0.2 was used. Each sampling location was screened individually for every chemical detected, and the results evaluated relative to both individual and cumulative risks and hazard levels.

Table 7 summarizes the properties of the compounds being assessed, which has been updated with 2021 toxicological data and 2024 screening levels. Table 8 summarizes the soil properties used for calculations. Table 9 summarizes the building properties used for the calculations and Table 10 presents the generic soil vapour criteria calculated. Table 11 presents the estimated risk and hazard for the volatile compounds that were detected in soil vapour.

The cumulative risk level for carcinogens in sample 24VW-01 was 6.3×10^{-3} (duplicate sample) and for 25VW-04 was 6.1×10^{-3} , which was greater than the target risk level of 1×10^{-5} .

The cumulative hazard level calculated for sample 24VW-01 was 5.9 for the parent sample and 4.4 for 25VW-04. This exceeds the target hazard level of 1.00.

6.0 EVALUATION OF SITE CONDITIONS

6.1 Summary of Site Conditions

The Site contains buried landfill waste in proximity to a surface water receptor, namely Waskasoo Creek. Based on findings from the 2024 and 2025, groundwater and soil vapour monitoring and sampling events and historical data for the Site, there are environmental concerns related to the presence of the former historical landfill. The groundwater quality appears to be affected by leachate at the hydraulically down-gradient monitoring wells near Waskasoo Creek.

The groundwater concentrations reported in 2024, with the exception of a few anomalous dissolved metals results at MW-04A, were reasonably consistent with previous results. Parameters that are typical of MSW leachate, including chloride and VOCs, have been reported at higher concentrations than those measured at up-gradient and cross-gradient wells. Previous groundwater analytical results collected for background monitoring well MW-02, located to the east and hydraulically up-gradient, do not suggest MSW leachate impacts at that location.

Waste was placed at the Site between approximately 1968 and 1970 (approximately 3 years). The landfilling timeframe would indicate that the estimated age of the waste material would be approximately 55 years old. Consequently, consistent groundwater quality results are to be expected, supporting a monitoring and sampling frequency requirement of less than once per year.

The February 2025 LFG field monitoring results at 25VW-04 were at low concentrations for methane at 0.7%, carbon dioxide was elevated at 7%, and oxygen was less than in ambient air at 12.7%. As 24VW-01 and 25VW-04 are located within the waste footprint, low oxygen and elevated carbon dioxide levels are to be expected as the waste breaks down.

The analytical LFG results for methane were lower at 24VW-01 (1.45 %, parent; 1.78%, duplicate) and 25VW-04 (0.65%) than in previous years at VW-01 and VW-04 and were comparable to the 2019 concentration measured at VW-02 (non-detect). The LFG results indicate low quantities of LFG are being generated from the waste, shown by

LFG concentrations within the waste footprint, whereas there is no indication of LFG migrating to the south of the Site at VW-02.

With respect to 24VW-01 and 25VW-04, it is important to note that previous LFG monitoring results at replaced soil vapour wells have often been much higher than the 2024 and 2025 measurements. Methane results have been reported at maximum concentrations of 5.46% in 2019 at VW-01 (duplicate) and 33.8% in 2022 at VW-04, both of which are above the LEL of 5%.

The elevated benzene concentration of 96.8 $\mu\text{g}/\text{m}^3$ for the duplicate of 24VW-01 appears to be an anomalous result and should be confirmed in the next sampling event. All other BTEX and PHC fractions F1 and F2 concentrations were at concentrations less than the soil vapour screening criteria.

The most recent results should be confirmed and warrant ongoing annual LFG monitoring. Headspace methane monitoring at the monitoring wells has provided inconsistent and often non-detect results and is not considered to add value to the monitoring program.

No potential erosion, cracking, and/or exposed waste was noted during the groundwater and soil vapour monitoring fieldwork completed in September and December 2024 and February 2025. The Site was under snow cover in both December and February, which limited visibility for assessing potential ground issues.

The proximity of Waskasoo Creek and identified impacts to groundwater quality from leachate warrant that groundwater quality continue to be monitored and that risk management measures will be necessary.

6.2 Summary of Hazard Quotient Results

A summary of the 2014 hazard quotients from the 2014 risk management plan (RMP) by Tiamat are outlined below as well as mitigative measures outlined by XCG Consulting Limited (XCG 2018).

For consistency with the approach presented XCG, Tetra Tech compared individual hazard quotients with the individual target hazard level (0.2). Based on the 2024 program, the greatest individual hazard quotient calculated for the Site was 2.2 for aromatics ($>C_8-C_{10}$) at 25VW-04 (vs. target hazard level of 0.2) and the greatest cumulative hazard quotient was 4.1 (vs target hazard level of 1.0) at 25VW-04. The greatest estimated individual cancer risk was 2.4×10^{-5} for benzene at 24VW-01 and the greatest estimated cumulative cancer risk was 6.5×10^{-5} (vs target Risk of 1.0×10^{-5}) at 24VW-01. XCG identified the following generic mitigative measures for developments within a 300 m setback of these landfills (based on Tiamat 2014),

Passive Measures

1. Passive Measures – Level A: for Cancer Risk of $> 1E-5$ and $< 5E-5$ and/or HQ >0.2 and <1 . Compacted clay liner with a minimum thickness of 1 m and confirmed maximum hydraulic conductivity of 10^{-8} m/sec.
2. Passive Measures – Level B: for Cancer Risk of $> 5E^{-5}$ and $< 5E^{-4}$ and/or HQ >1 and <5 . Synthetic liner with type of material, thickness, and installation details dependent on the design professional.
3. Passive Measures – Level C: for Cancer Risk of $> 5E^{-4}$ and $< 1E^{-3}$ and/or HQ >5 and <50 .
4. Passive sub-slab depressurization (SSD) system with a minimum depressurization of 4 to 10 Pa. In some instances (such as a pervious subgrade), the actual depressurization necessary may require an active SSD or alternative active ventilation system.

Active Measures

Field verify the presence of the identified chemicals of concern and other potential chemicals in the soil gas state at the development site. If confirmed, determine the most appropriate manner to prevent soil vapour intrusion.

1. Active Measures – Level D: for Cancer Risk of $> 1E^{-3}$ and $< 2E^{-3}$ and/or HQ values >50 and <100 . Active SSD must be configured to compensate for depressurization of the building and have adequate negative pressure gradients across the entire footprint of the foundation.
2. Active Measures – Level E: for Cancer Risk of $>2E^{-3}$ and/or HQ values >100 . Installation of geomembrane and active soil vapour extraction with system fault notification alarm.

Based on discussions with The City, a relatively new commercial building is present approximately 60 m east of VW-04. The building is associated with a car dealership and thought to be used for motor vehicle repair and includes a paint spray booth. The commercial use of the building suggests that ventilation and air quality control systems will be in place, and therefore it is unlikely that it would be a sensitive receptor for potential LFG migration.

Future applications for development of sensitive land use within the setback are subject to review by The City. The developer's team would be responsible for reviewing and verifying the available data relative to their proposed development. The mitigative measures presented above are generic and can be used as a general guide for expectations by The City. Ultimately, the developer's design engineer would be responsible for developing measures specific to the intended development based on the above or an appropriate equivalent. Protection of workers (e.g., construction and utility) should form part of any development plan.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of the groundwater and vapour monitoring and sampling conducted in 2024, early 2025, and previous years, Tetra Tech has developed the following conclusions:

- The inferred groundwater flow direction, from the September 2024 elevation contours, was northwest towards Waskasoo Creek, which is consistent with previous findings.
- There is evidence of impact to groundwater by leachate, outlined below, similar to the previous results:
 - Routine groundwater chemistry parameters and dissolved metals that exceeded the Tier 1 Guidelines at one or more monitoring wells in 2024 included TDS, chloride, sodium, and dissolved aluminum, antimony, arsenic, cadmium, copper, iron, manganese, selenium, uranium, and zinc. Exceedances for antimony, cadmium, copper, selenium, and zinc at MW-04A are considered anomalous and should be confirmed in the next sampling event. The exceedance for aluminum at MW-05 is considered a filtration issue and not evidence of an environmental effect.
 - The chlorinated VOC vinyl chloride exceeded the Tier 1 Guideline at MW-01 and MW-05. The chlorinated VOCs cis- and trans-1,2-dichloroethene (1,2-DCE) were measured at MW-01, MW-04A (cis 1,2-DCE only), and MW-05. The measured concentrations suggest leachate has impacted the groundwater quality at MW-01, MW-04A, and MW-05. All are breakdown products of commonly used solvents TCE, and PCE. The concentrations measured in 2024 are consistent with previous results.
 - A miscommunication led to ammonia not being analyzed as part of the 2024 analytical suite of routine water quality parameters. However, given the minimal overall changes in water chemistry observed in the other parameters during the 2024 monitoring event, it is likely that the ammonia concentrations also remained relatively unchanged from those measured in the 2022 sampling event, which were below Tier 1 Guidelines and ranged from 0.103 mg/L (MW-04A) to 5.59 mg/L (MW-05).

- The 2024 concentrations of toluene, ethylbenzene, xylenes, styrene, and PHC fractions F1 and F2 were less than the analytical detection limits at groundwater monitoring wells MW-01, MW-04A, and MW-05. Detectable concentrations of benzene less than the Tier 1 Guideline were measured at MW-01 and MW-05.
- LFG is present within the waste footprint of the Site, similar to previous results:
 - Soil vapour wells 24VW-01 and 25VW-04 were re-installed following integrity issues, in September 2024 and January 2025, respectively. LFG monitoring results in December 2024 at 24VW-01 and VW-02, and in February 2025 at 25VW-04 were at low (<0.7% maximum) concentrations for methane. The soil vapour well 25VW-04 was re-installed in the immediate vicinity of VW-04 where previously methane concentrations up to 30.3% were measured, so the February 2025 results from 25VW-04 may not be representative of the elevated methane concentrations known to be present for the northeast portion of the Site. Historically, methane concentrations were also measured at VW-01 at a maximum of 26.0% in 2013, and most recently at 0.0% in 2022.
 - The benzene concentration of 96.8 µg/m³ in the duplicate sample from 24VW-01 exceeded the soil vapour screening criteria of 41 µg/m³ derived in accordance with CCME (2014); the concentration in the primary sample was 18.8 µg/m³. The elevated benzene for the duplicate at this location appears to be an anomalous result and should be confirmed in the next sampling event. All other BTEX and PHC fractions F1 and F2 concentrations were at concentrations less than the soil vapour screening criteria.
 - The soil vapour samples collected from 24VW-01 and 25VW-04 both had a cumulative cancer risk that exceeded the cancer target risk of 1.0 x 10⁻⁵, and the cumulative hazard quotients were above the target hazard level of 1.00 for both locations. Historically, risk and hazard levels were similarly exceeded at VW-01.
 - Oil, also called free product, was observed at the bottom of soil vapour well 25VW-04. This occurrence should be confirmed in the next monitoring event, as its presence may interfere with soil vapour measurements.

Waskasoo Creek is considered a receptor of any groundwater passing through the Site. Surface water analytical results in 2024 along Waskasoo Creek suggest that the surface water quality has not been impacted by groundwater from the Site as most concentrations were higher upstream than downstream.

The results of the groundwater and vapour monitoring program in 2024, and early 2025, in combination with results from previous years, indicate there are impacts to groundwater and that vapours being generated from the buried waste remaining in place at RDM. Therefore, ongoing risk management is required, including ongoing monitoring and administrative controls.

The following recommendations are made according to these risk management elements.

Ongoing Monitoring:

- Based on the thin soil cover identified in the earlier work by Tiamat, continue to conduct an annual basic site walkover when there is no snow cover to document any vegetation die-off and exposed soils, which may lead to potential erosion, cracking, and/or exposed wastes. This information may be used to evaluate whether vegetation cover improvements or potential repairs to the cap are necessary. During the site walkover the condition of monitoring wells and soil vapour wells should also be verified.
- Conduct annual surface water sampling of Waskasoo Creek both upstream and downstream of the Site to assess potential impacts from leachate-impacted groundwater entering the creek from the Site. This sampling will be done as part of the Red Deer College monitoring and sampling program and applied to the Red Deer Motors site. The surface water sample should be analyzed for pH, EC, routine water chemistry parameters, ammonia, total metals, BTEX, and PHC fractions F1 and F2 and VOCs. Consideration may be given to an additional sampling point north of 32nd Street, to better assess downstream rather than cross-stream impacts, as well as any potential contributions from 32nd Street.

- Water levels at all accessible monitoring wells should continue to be monitored annually to confirm the groundwater flow pattern. Three of the wells (MW-01, MW-04A, and MW-05) should continue to be sampled for routine groundwater chemistry parameters, including ammonia, dissolved metals, BTEX, PHC fractions F1 and F2, and VOCs. As the groundwater flow pattern and groundwater quality are reasonably well defined, a reduced sampling frequency as presented below is suggested.
- Continued annual vapour monitoring is considered warranted to confirm conditions. The suggested monitoring schedule includes measurements of headspace pressures and LFG concentrations in the three remaining vapour wells 24VW-01, VW-02, and 25VW-04. Headspace vapour monitoring at the groundwater monitoring wells is considered to be of limited value and is not proposed for future monitoring events.
- Based on the results of the soil vapour sample from 24VW-01, and previous results at VW-04, there is a potential vapour intrusion risk in northwest and northeast portions of the Site and continued soil vapour sampling of VW-01 and 25VW-04 is recommended.
- Based on the above, the following monitoring program is proposed. If results remain consistent, reducing the monitoring and sampling frequency further over time may be warranted.

Table 7-1: Proposed Site Condition, Surface Water, Groundwater, and Vapour Monitoring Program

Activity	2025	2026	2027	2028	2029	2030
Annual (Summer) Site Walkover	X	X	X	X	X	X
Annual (Summer) Surface water sampling of Waskasoo Creek (Upgradient and Downgradient)	X	X	X	X	X	X
Annual (Summer) Groundwater Monitoring of All Accessible Monitoring Wells and Sampling of Three Monitoring Wells (MW-01, MW-04A, and MW-05)		X			X	
Annual (Winter) Vapour Monitoring at 24VW-01, VW-02 and 25VW-04 and Vapour Sampling at 24VW-01 and 25VW-04.	X	X	X	X	X	X

Notes:

The proposed monitoring program is to be reviewed on an annual basis as new information becomes available.

Administrative Actions:

- Utilize the revised generic mitigative measures as a guide when evaluating applications for sensitive development within the setback.
- Ensure that the Site is clearly identified within The City’s Zoning Bylaw and appropriate administrative requirements are met for the Site in accordance with City policies. If changes to the land use are identified, recommend measures be taken to protect users.
- Ensure that the Site is clearly identified within The City’s utility mapping system. Elevated gas concentrations are present in the subsurface proximate to the corner of 32nd Street and Taylor Drive. Future activities in this vicinity (e.g., utility work, repairs, paving) should consider the potential presence of gas and a site-specific safety plan should be developed for work undertaken to limit the potential for exposure to site workers.
- The City should review the site condition on an ongoing basis to ensure that the cover remains intact and drainage remains positive. Repairs or maintenance should be undertaken as required to maintain the Site.

8.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

FILE: 704-SWM.SWOP04071-04.004
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<p>PERMIT TO PRACTICE TETRA TECH CANADA INC.</p> <p>RM SIGNATURE: _____</p> <p>RM APEGA ID #: _____</p> <p>DATE: _____</p> <p>PERMIT NUMBER: P013774 The Association of Professional Engineers and Geoscientists of Alberta (APEGA)</p>

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Table 1: Groundwater Monitoring Results

Monitoring Well		MW-01	MW-02	MW-03	MW-04A	MW-04B	MW-05
Total Drilled Depth (m)		6.1	6.6	5.1	4.6	6.0	4.6
Top of Screened Interval (mbg)		872.5	-	-	-	-	-
Bottom of Screened Interval (mbg)		867.9	-	-	-	-	-
Stick up (m)		1.09	0.79	0.01	0.20	0.78	0.52
Ground Elevation (m)		874.01	877.30	877.30	871.28	871.28	872.75
TPC Elevation (m)		875.10	878.10	877.31	871.48	872.20	873.50
Depth to Groundwater (mBTPC)	Aug-13	4.17	3.03	-	-	-	-
	Jun-19	5.04	CNL	CNL	-	-	-
	Dec-19	5.37	CNL	CNL	2.97	1.80	3.18
	Jul-21	5.20	3.72	-	2.03	1.77	3.42
	Nov-21	5.44	4.61	3.51	3.09	1.77	3.38
	Dec-22	5.41	4.10	3.53	2.96	1.68	3.21
	Sep-24	5.39	4.04	3.47	3.04	1.74	3.44
Groundwater Elevation (m)	Aug-13	869.84	874.28	-	-	-	-
	Jun-19	870.06	-	-	-	-	-
	Dec-19	869.73	-	-	868.52	870.39	870.32
	Jul-21	869.90	874.38	-	869.45	870.43	870.08
	Nov-21	869.66	873.49	873.79	868.39	870.43	870.12
	Dec-22	869.19	873.99	873.77	868.53	870.52	870.28
	Sep-24	869.71	874.05	873.83	868.44	870.45	870.05
Volatile Organic Compounds* (VOCs) (ppm)	Jun-19	12	CNL	CNL	-	-	-
	Dec-19	1	CNL	CNL	ND	ND	ND
Combustible Vapour Concentrations** (CVCs) (ppm)	Jun-19	190	CNL	CNL	-	-	-
	Dec-19	10	CNL	CNL	ND	ND	ND
Methane Concentrations** (ppm)	Jul-21	ND	ND	-	25	ND	5
	Nov-21	35	420	90	60	15	ND
	Dec-22	35	25	55	ND	25	15
	Sep-24	ND	ND	ND	ND	ND	ND

Notes:

mbg - Metres below grade.

mBTPC - Metres below top of plastic pipe casing.

- Not monitored/information unavailable.

ND - Non-detect.

CNL - Could not locate.

ppm - Parts per million.

*- Measured using an RKI Eagle II calibrated to hexane and isobutylene operated in methane elimination mode.

** - Measured using an RKI Eagle II calibrated to methane.

Table 2: Groundwater Analytical Results

Parameter	Units	Tier 1 Guideline 1,2	MW-01						MW-02		MW-04A				MW-04B	MW-05			
			MW-01	MW-01	MW-01	DUPLICATE	MW-01	DUPLICATE	MW-02	MW-02	MW-04A	MW-04A	MW-04A	MW-04A	MW-04B	MW-05	MW-05	MW-05	MW-05
			6-Dec-2019	23-Nov-2021	09-Dec-2022	09-Dec-2022	06-Sep-2024	06-Sep-2024	23-Nov-2021	23-Nov-2021	6-Dec-2019	23-Nov-2021	09-Dec-2022	06-Sep-2024	6-Dec-2019	6-Dec-2019	23-Nov-2021	09-Dec-2022	06-Sep-2024
Field Testing																			
Field Temperature	°C	-	6.6	5.7	4.2	-	8.7	8.7	4.4	-	5.5	4.1	4.79	-	4.6	2.2	6.0	4.4	9.1
Field Electric Conductivity	µS/cm	-	2,213	1821	1,505	-	2,680	2,680	965	-	1,754	2,061	1,717	-	1,282	1,918	1,131	1,296	2,530
Field pH	pH Units	6.5 to 8.5	8.32	7.28	6.77	-	6.62	6.62	7.38	-	7.90	7.47	7.23	-	8.40	7.81	6.28	6.88	6.65
Routine																			
pH	pH Units	6.5 to 8.5	7.71	7.32	7.17	7.19	7.27	7.18	7.56	7.58	8.10	7.75	7.78	7.81	7.80	7.76	7.40	7.76	7.08
Electrical Conductivity (EC)	µS/cm	-	2,220	2220	2,470	2,470	2,530	2,530	1040	1040	1,250	2670	2,740	2,650	1,260	1,930	2270	2,060	2,460
Total Dissolved Solids (TDS)	mg/L	500	1,300	1350	1,560	1,560	1,470	1,460	645	645	1,840	1780	1,840	1,740	1,040	1,060	1460	1,340	1,520
Hardness as CaCO ₃	mg/L	-	811	815	877	865	788	801	544	557	1,140	953	1,010	929	201	812	904	908	973
Alkalinity (total as CaCO ₃)	mg/L	-	564	537	772	770	697	652	517	510	559	710	737	761	881	581	1110	970	1,030
Bicarbonate	mg/L	-	688	655	941	940	850	795	631	623	682	866	899	928	1,070	709	1350	1,180	1,260
Carbonate	mg/L	-	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Hydroxide	mg/L	-	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0
Calcium	mg/L	-	161	162	170	170	153	158	133	137	249	210	206	199	49.8	161	174	169	182
Magnesium	mg/L	-	99.4	99.8	110	107	98.5	98.8	51.6	52.1	126	104	120	105	18.6	99.6	114	118	126
Potassium	mg/L	-	9.55	7.41	8.61	8.43	7.71	7.82	7.48	7.51	5.29	5.21	4.62	5.94	3.37	9.91	9.21	8.52	10.4
Sodium	mg/L	200	189	173	238	232	214	217	16.7	17.0	284	262	289	269	256	177	183	177	183
Chloride	mg/L	120	423	450	381	393	460	463	54.1	52.6	450	363	349	315	6.8	167	187	179	207
Fluoride	mg/L	1.5	0.12	0.240	0.253	0.231	0.176	0.181	0.193	0.196	0.14	0.259	0.266	0.239	0.35	<0.10	0.163	0.235	0.120
Phosphorus - Total	mg/L	-	1.72	-	-	-	-	-	-	-	0.761	-	-	-	0.085	2.29	-	-	-
Sulphate	mg/L	429 ³	79.1	70.0	118	120	52.2	53.4	43.5	43.4	394	393	416	372	174	94.9	79.6	68.9	153
Ionic Balance	N/A	-	101	100	102	99.0	93.6	97.8	101	101	110	102	99.1	95.3	71.4	135	102	103	94.6
Nutrients																			
Ammonia as N	mg/L	2.8 ⁶	7.2	2.12	2.82	2.80	-	-	0.111	0.130	0.450	0.372	0.103	-	0.306	7.1	6.43	5.59	-
Nitrate (as NO ₃ -N)	mg/L	3	<0.10	<0.10	<0.100	<0.100	<0.100	<0.100	<0.10	<0.10	<0.10	<0.10	<0.100	0.202	<0.10	<0.10	<0.10	<0.100	<0.100
Nitrite (as NO ₂ -N)	mg/L	0.20 ⁴	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Nitrate and Nitrite (as N)	mg/L	-	<0.11	-	<0.112	<0.112	<0.112	<0.112	-	-	<0.11	-	<0.112	0.202	<0.11	<0.11	-	<0.112	<0.112
Total Kjeldahl Nitrogen (TKN)	mg/L	-	9.9	-	-	-	-	-	-	-	10.9	-	-	-	0.51	8.9	-	-	-
Carbon																			
Dissolved Organic Carbon (DOC)	mg/L	-	10.6	-	-	-	-	-	-	-	23.0	-	-	-	7.4	18.3	-	-	-
Dissolved Metals																			
Aluminum	mg/L	0.050 ⁵	0.0016	0.0061	0.0064	0.0081	<0.0020	<0.0020	0.0028	0.0024	0.0027	<0.0050	0.0084	0.0037	0.0027	0.0028	<0.0050	<0.0050	0.0641
Antimony	mg/L	0.006	<0.00010	0.00053	<0.00050	<0.00050	<0.00020	<0.00020	<0.00010	<0.00010	0.00147	0.00502	0.00183	0.00952	<0.00010	0.00021	<0.00050	<0.00050	0.00023
Arsenic	mg/L	0.005	0.0225	0.0210	0.0202	0.0195	0.0228	0.0232	0.000160	0.00018	0.0146	0.0125	0.00356	0.00425	0.00711	0.0134	0.0139	0.00591	0.00864
Barium	mg/L	1	0.604	0.531	0.540	0.534	0.616	0.600	0.139	0.140	0.0479	0.0429	0.0452	0.0531	0.0228	0.794	0.708	0.665	0.796
Beryllium	mg/L	-	-	<0.00010	-	-	-	-	<0.00020	<0.00020	-	<0.00010	-	-	-	<0.00010	-	-	-
Bismuth	mg/L	-	-	<0.000205	-	-	-	-	<0.000050	<0.000050	-	<0.000205	-	-	-	<0.000205	-	-	-
Boron	mg/L	1.5	0.079	0.068	0.075	0.074	0.073	0.075	0.064	0.066	0.142	0.138	0.156	0.139	0.214	0.169	0.215	0.210	0.175
Cadmium	mg/L	0.00037 ³	0.0000142	<0.0000250	<0.0000250	<0.0000250	<0.0000100	<0.0000100	0.0000574	0.0000579	0.0000150	0.0000420	<0.0000250	0.00194	0.0000275	0.0000461	0.0000301	0.0000365	0.0000706
Chromium	mg/L	0.05	0.00013	<0.0025	<0.00050	<0.00050	<0.00100	<0.00100	<0.00050	<0.00050	0.00023	<0.0025	<0.00050	<0.00100	<0.00010	0.00029	<0.0025	<0.00050	<0.00100
Cobalt	mg/L	-	-	0.00302	-	-	-	-	0.00166	0.00171	-	0.0031	-	-	-	-	0.0151	-	-
Copper	mg/L	0.007	0.00033	<0.0010	<0.00100	<0.00100	<0.00040	<0.00040	0.00056	0.00060	0.00358	0.00149	0.00231	0.154	0.00037	0.00753	<0.0010	<0.00100	0.00250
Iron	mg/L	0.30	24.4	24.1	24.8	24.1	25.3	25.4	<0.010	<0.010	1.23	0.425	0.315	<0.020	0.025	7.43	10.4	6.58	6.93
Lead	mg/L	0.007 ³	<0.000050	<0.000250	<0.000250	<0.000250	<0.000100	<0.000100	<0.000050	<0.000050	0.000225	0.000302	<0.000250	0.000540	<0.000050	0.000246	<0.000250	<0.000250	0.000348
Lithium	mg/L	-	-	0.0455	-	-	-	-	0.0489	0.0508	-	0.115	-	-	-	-	0.0787	-	-
Manganese	mg/L	0.020	1.91	1.95	2.11	2.08	1.86	1.94	1.48	1.49	0.732	0.578	0.399	0.481	0.178	1.28	1.62	1.51	1.91
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	-	-	0.00243	-	-	-	-	0.000335	0.000316	-	0.0133	-	-	-	-	0.00281	-	-
Nickel	mg/L	0.17 ³	0.0135	0.00921	0.0103	0.0103	0.0137	0.0138	0.00246	0.00236	0.0346	0.0329	0.0212	0.0508	<0.00050	0.0262	0.0275	0.0260	0.0268
Phosphorus	mg/L	-	-	<0.25	-	-	-	-	<0.050	<0.050	-	<0.25	-	-	-	-	<0.25	-	-
Selenium	mg/L	0.002	0.000074	<0.00025	<0.000250	<0.000250	0.000116	0.000106	<0.000050	<0.000050	0.000172	0.000255	0.000324	0.00298	<0.000050	0.000245	<0.00025	<0.000250	0.000193
Silicon	mg/L	-	-	14.6	-	-	-	-	9.89	10.1	-	5.55	-	-	-	-	10.4	-	-
Silver	mg/L	0.0001	<0.000010	<0.000050	<0.000050	<0.000050	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000020	<0.000010	<0.000010	<0.000050	<0.000050	<0.000020
Strontium	mg/L	-	-	1.52	-	-	-	-	0.988	1.02	-	1.62	-	-	-	-	1.79	-	-
Sulphur	mg/L	-	-	25.2	-	-	-	-	15.5	15.8	-	136	-	-	-	-	26.8	-	-
Thallium	mg/L	-	-	<0.000050	-	-	-	-	0.000036	0.000034	-	<0.000050	-	-	-	-	<0.000050	-	-
Tin	mg/L	-	-	<0.00050	-	-	-	-	<0.00010	<0.00010	-	<0.00050	-	-	-	-	<0.00050	-	-
Titanium	mg/L	-	-	<0.00150	-	-	-	-	<0.00030	<0.00030	-	<0.00150	-	-	-	-	<0.00150	-	-
Uranium	mg/L	0.015	0.00196	0.00151	0.00384	0.00399	0.00287	0.00279	0.00910	0.00938	0.0391	0.0993	0.0919	0.0918	0.00217	0.00927	0.0131	0.0122	0.0122
Vanadium	mg/L	-	-	<0.0025	-	-	-	-	<0.00050	<0.00050	-	<0.0025	-	-	-	-	<0.0025	-	-
Zinc	mg/L	0																	

Table 3: Groundwater Quality Assurance/Quality Control Analytical Results

Parameter	Units	RDL	MW-01	DUPLICATE	RPD (%)
			06-Sep-2024	06-Sep-2024	
Routine					
pH	pH Units	0.1	7.27	7.18	1
Electrical Conductivity (EC)	µS/cm	2	2,530	2,530	-
Total Dissolved Solids (TDS)	mg/L	1	1,470	1,460	0.7
Hardness as CaCO ₃	mg/L	0.5	788	801	2
Alkalinity (total as CaCO ₃)	mg/L	2	697	652	7
Bicarbonate	mg/L	5	850	795	7
Carbonate	mg/L	5	<1.0	<1.0	-
Hydroxide	mg/L	5	<1.0	<1.0	-
Calcium	mg/L	0.05	153	158	3
Magnesium	mg/L	0.005	98.5	98.8	0.3
Potassium	mg/L	0.05	7.71	7.82	1
Sodium	mg/L	0.05	214	217	1
Chloride	mg/L	2.5	460	463	0.7
Fluoride	mg/L	0.1	0.176	0.181	-
Sulphate	mg/L	1.5	52.2	53.4	2
Ionic Balance	N/A	0.01	93.6	97.8	4
Nutrients					
Ammonia as N	mg/L	0.05	-	-	-
Nitrate (as NO ₃ -N)	mg/L	0.1	<0.100	<0.100	-
Nitrite (as NO ₂ -N)	mg/L	0.05	<0.050	<0.050	-
Nitrate and Nitrite (as N)	mg/L	0.11	<0.112	<0.112	-
Dissolved Metals					
Aluminum	mg/L	0.001	<0.0020	<0.0020	-
Antimony	mg/L	0.0001	<0.00020	<0.00020	-
Arsenic	mg/L	0.0001	0.0228	0.0232	2
Barium	mg/L	0.0001	0.616	0.6	3
Boron	mg/L	0.01	0.073	0.075	3
Cadmium	mg/L	0.000005	<0.0000100	<0.0000100	-
Chromium	mg/L	0.0001	<0.00100	<0.00100	-
Copper	mg/L	0.0002	<0.00040	<0.00040	-
Iron	mg/L	0.01	25.3	25.4	0.4
Lead	mg/L	0.00005	<0.000100	<0.000100	-
Manganese	mg/L	0.0001	1.86	1.94	4
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	-
Nickel	mg/L	0.0005	0.0137	0.0138	0.7
Selenium	mg/L	0.00005	0.000116	0.000106	-
Silver	mg/L	0.00001	<0.000020	<0.000020	-
Uranium	mg/L	0.00001	0.00287	0.00279	3
Zinc	mg/L	0.001	<0.0020	0.0027	-
Hydrocarbons					
Benzene	mg/L	0.0005	0.00242	0.00221	-
Toluene	mg/L	0.0005	<0.00050	<0.00050	-
Ethylbenzene	mg/L	0.0005	<0.00050	<0.00050	-
Xylenes (m & p)	mg/L	0.0005	<0.00040	<0.00040	-
Xylene (o)	mg/L	0.0005	<0.00030	<0.00030	-
Xylenes Total	mg/L	0.00071	<0.00050	<0.00050	-
Styrene	mg/L	0.0005	<0.00050	<0.00050	-
F1 (C ₆ -C ₁₀)	mg/L	0.1	<0.1	<0.1	-
F1 (C ₆ -C ₁₀) - BTEX	mg/L	0.1	<0.1	<0.1	-
F2 (C ₁₀ -C ₁₆)	mg/L	0.1	<0.1	<0.1	-
Volatile Organic Compounds (VOCs)					
1,1,1,2-Tetrachloroethane	mg/L	0.001	<0.0010	<0.0010	-
1,1,1-Trichloroethane	mg/L	0.0005	<0.0010	<0.0010	-
1,1,2,2-Tetrachloroethane	mg/L	0.0005	<0.0010	<0.0010	-
1,1,2-Trichloroethane	mg/L	0.0005	<0.0010	<0.0010	-
1,1-Dichloroethane	mg/L	0.0005	<0.0010	<0.0010	-
1,1-Dichloroethene	mg/L	0.0005	<0.0010	<0.0010	-
1,1-Dichloropropene	mg/L	0.001	<0.0010	<0.0010	-
1,2,3-Trichlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
1,2,3-Trichloropropane	mg/L	0.0005	<0.0010	<0.0010	-
1,2,4-Trichlorobenzene	mg/L	0.001	<0.0010	<0.0010	-
1,2,4-Trimethylbenzene	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dibromo-3-chloropropane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dibromoethane	mg/L	0.0005	<0.0010	<0.0010	-
1,2-Dichlorobenzene	mg/L	0.0005	<0.00050	<0.00050	-
1,2-Dichloroethane	mg/L	0.001	<0.0010	<0.0010	-
1,2-Dichloroethene (cis)	mg/L	0.001	0.0174	0.0154	12
1,2-Dichloroethene (trans)	mg/L	0.0005	0.0037	0.0033	11
1,2-Dichloropropane	mg/L	0.0005	<0.0010	<0.0010	-
1,3,5-Trimethylbenzene	mg/L	0.001	<0.0010	<0.0010	-
1,3-Dichlorobenzene	mg/L	0.0005	<0.0010	<0.0010	-
1,3-Dichloropropane	mg/L	0.001	<0.0010	<0.0010	-
1,3-Dichloropropene	mg/L	0.0015	<0.0015	<0.0015	-
1,3-Dichloropropene [cis]	mg/L	0.0005	<0.0010	<0.0010	-
1,3-Dichloropropene [trans]	mg/L	0.001	<0.0010	<0.0010	-
1,4-Dichlorobenzene	mg/L	0.0005	<0.0010	<0.0010	-
2,2-Dichloropropane	mg/L	0.001	<0.0010	<0.0010	-
2-Chlorotoluene	mg/L	0.001	<0.0010	<0.0010	-
4-Chlorotoluene	mg/L	0.001	<0.0010	<0.0010	-
Bromobenzene	mg/L	0.001	<0.0010	<0.0010	-
Bromochloromethane	mg/L	0.001	<0.0010	<0.0010	-
Bromodichloromethane	mg/L	0.0005	<0.0010	<0.0010	-
Bromoform	mg/L	0.0005	<0.0010	<0.0010	-
Bromomethane	mg/L	0.001	<0.0010	<0.0010	-
Carbon tetrachloride	mg/L	0.0005	<0.00050	<0.00050	-
Chlorobenzene	mg/L	0.0005	<0.0010	<0.0010	-
Chloroethane	mg/L	0.001	<0.0010	<0.0010	-
Chloroform	mg/L	0.0005	<0.0010	<0.0010	-
Chloromethane	mg/L	0.001	<0.0050	<0.0050	-
Dibromochloromethane	mg/L	0.0005	<0.0010	<0.0010	-
Dibromomethane	mg/L	0.0005	<0.0010	<0.0010	-
Dichlorodifluoromethane	mg/L	0.0005	<0.0010	<0.0010	-
Hexachlorobutadiene	mg/L	0.001	<0.0010	<0.0010	-
iso-Propylbenzene (cumene)	mg/L	0.001	<0.0010	<0.0010	-
Methyl t-Butyl Ether (MTBE)	mg/L	0.0005	<0.00050	<0.00050	-
Methylene Chloride	mg/L	0.001	<0.0010	<0.0010	-
n-Butylbenzene	mg/L	0.001	<0.0010	<0.0010	-
n-Propylbenzene	mg/L	0.001	<0.0010	<0.0010	-
p-Isopropyltoluene	mg/L	0.001	<0.0010	<0.0010	-
sec-Butylbenzene	mg/L	0.001	<0.0010	<0.0010	-
tert-Butylbenzene	mg/L	0.001	<0.0010	<0.0010	-
Tetrachloroethene	mg/L	0.0005	<0.0010	<0.0010	-
Trichloroethene	mg/L	0.0005	<0.0010	<0.0010	-
Trichlorofluoromethane	mg/L	0.001	<0.0010	<0.0010	-
Trihalomethanes	mg/L	0.002	<0.0020	<0.0020	-
Vinyl chloride	mg/L	0.0005	0.0061	0.0043	35

Notes:

RDL - Reportable detection limit.

RPD - Relative Percentage Difference calculated as $RPD(\%) = \frac{|V1 - V2|}{(V1 + V2)/2} * 100$ where V1, V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL.

N/A - Not applicable.

BOLD - RPD value greater than 20%.

Table 4: Surface Water Analytical Results

Parameter	Unit	Guideline ¹	SW-01 DOWNSTREAM 13 Jul 2021	SW-01 DOWNSTREAM 09 Sep 2021	SW-01 DOWNSTREAM 10 Nov 2022	SW-01 07 Sep 2024	SW-02 UPSTREAM 13 Jul 2021	SW-02 UPSTREAM 09 Sep 2021	SW-02 UPSTREAM 10 Nov 2022	SW-02 07 Sep 2024
Field Parameters										
Field pH	pH Units	6.5-9	-	-	8.35	8.14	-	-	8.83	7.84
Field Temperature	°C	-	-	-	-0.3	20.5	-	-	-0.1	18.7
Field Electric Conductivity	µS/cm	-	-	-	1,734	1038	-	-	2,350	1318
Routine										
pH	pH Units	6.5-9	8.28	8.47	8.15	8.49	8.41	8.41	8.17	8.28
Electrical Conductivity (EC)	µS/cm	-	1,130	1,140	1,210	950	1,110	1,260	1,200	1,240
Total Dissolved Solids (TDS)	mg/L	-	680	664	793	568	672	763	786	761
Hardness as CaCO ₃	mg/L	-	457	469	552	414	440	573	550	565
Alkalinity (total as CaCO ₃)	mg/L	20	390	325	460	317	386	413	462	445
Bicarbonate	mg/L	-	475	364	561	368	442	474	563	537
Carbonate	mg/L	-	<5.0	15.7	<1	8.9	14.3	14.9	<1	2.8
Hydroxide	mg/L	-	<5.0	<5.0	<1	<1.0	<5.0	<5.0	<1	<1.0
Calcium	mg/L	-	93.5	77.4	120	74.2	89.6	119	119	117
Magnesium	mg/L	-	54.4	67.0	61.2	57.3	52.5	67.0	61.4	72.0
Potassium	mg/L	-	6.56	7.18	8.83	5.58	6.49	7.06	8.84	6.66
Sodium	mg/L	-	78.1	76.2	86.7	60.0	78.1	74.5	86.5	72.2
Chloride	mg/L	120	120	146	139	115	119	146	136	141
Fluoride	mg/L	-	0.20	0.14	0.201	0.228	0.20	0.16	0.197	0.187
Sulphate	mg/L	429 ^{#1}	87.2	90.5	75	60.2	90.1	92.8	70.9	63.3
Ionic Balance	%	-	97.1	102	101	101	94.8	103	103	102
Nutrients										
Ammonia as N	mg/L	0.69 ^{#2}	-	<0.050	0.0874	-	-	0.058	0.0792	-
Nitrate (as NO ₃ -N)	mg/L	3	1.34	1.01	1.41	0.642	0.90	1.96	1.36	1.64
Nitrite (as NO ₂ -N)	mg/L	0.2 ^{#3}	<0.050	<0.050	<0.05	<0.050	<0.050	<0.050	<0.05	<0.050
Nitrate and Nitrite (as N) (mg/L)	mg/L	-	1.34	1.01	1.41	0.642	0.90	1.96	1.36	1.64
Total Metals										
Aluminum	mg/L	0.05 ^{#4}	0.0390	0.0090	0.0284	0.0468	0.0193	0.0550	0.059	0.448
Antimony	mg/L	-	0.00023	0.00034	0.00023	0.00035	0.00023	0.00047	0.00021	0.00035
Arsenic	mg/L	0.005	0.00327	0.00163	0.00121	0.00121	0.00241	0.00216	0.00176	0.00217
Barium	mg/L	-	0.200	0.222	0.196	0.166	0.167	0.307	0.2	0.277
Boron	mg/L	1.5	0.063	0.084	0.078	0.088	0.061	0.085	0.082	0.107
Cadmium	mg/L	0.00037 ^{#1}	0.0000169	<0.000050	<0.000050	0.000057	0.0000690	0.0000118	0.000013	0.0000195
Chromium	mg/L	0.001	0.00015	0.00014	<0.0005	<0.00050	0.00013	0.00022	<0.0005	0.00076
Copper	mg/L	0.007 ^{#1}	0.00107	0.00135	0.00122	0.00148	0.00123	0.00194	0.00119	0.00174
Iron	mg/L	0.3	0.349	0.231	0.362	0.164	0.181	0.526	0.551	0.950
Lead	mg/L	0.007 ^{#1}	0.000133	<0.000050	0.000054	0.000074	0.000089	0.000100	0.00009	0.000749
Manganese	mg/L	-	0.0888	0.0194	0.0428	0.0115	0.0167	0.103	0.0897	0.152
Mercury	mg/L	0.000005	<0.000050	-	<0.000005	<0.0000050	<0.0000050	-	<0.000005	<0.0000050
Nickel	mg/L	0.17 ^{#1}	0.00255	0.00261	0.00306	0.00232	0.00242	0.00294	0.00309	0.00390
Selenium	mg/L	0.002	0.000500	0.000813	0.000326	0.000385	0.000404	0.000853	0.000382	0.000527
Silver	mg/L	0.00025	<0.000010	<0.000010	<0.00001	<0.000010	<0.000010	<0.000010	<0.00001	<0.000010
Uranium	mg/L	0.015	0.00547	0.00821	0.00593	0.00637	0.00502	0.00818	0.00587	0.00812
Zinc	mg/L	0.03	0.0112	0.0030	0.0082	0.0062	0.0059	0.0139	0.0111	0.132
Hydrocarbons										
Benzene	mg/L	0.04	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050
Toluene	mg/L	0.0005	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050
Ethylbenzene	mg/L	0.09	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050
Xylene (o)	mg/L	-	<0.00050	<0.00050	<0.0003	<0.00030	<0.00050	<0.00050	<0.0003	<0.00030
Xylenes (m & p)	mg/L	-	<0.00050	<0.00050	<0.0004	<0.00040	<0.00050	<0.00050	<0.0004	<0.00040
Xylenes Total	mg/L	0.03	-	<0.00071	<0.0005	<0.00050	-	<0.00071	<0.0005	<0.00050
Styrene	mg/L	0.072	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050
F1 (C6-C10)	mg/L	-	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1
F1 (C6-C10) - BTEX	mg/L	-	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1
F2 (C10-C16 Hydrocarbons)	mg/L	0.11	<0.10	<0.10	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1
Total BTEX	mg/L	-	-	-	<0.001	<0.0010	-	-	<0.001	<0.0010

Notes:

SW-01 is downstream and SW-02 is upstream.

¹ Government of Alberta. 2018. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta. Table 1 Surface water quality guidelines for the protection of freshwater aquatic life (PAL). Most conservative values applied (chronic or acute).

^{#1} Guideline varies with hardness. Values shown based on hardness range of 414 mg/L to 573 mg/L.

^{#2} Guideline varies with pH and temperature. Values shown based on pH range of 8.15 to 8.49 and temperature range of 13.9°C to 16.7°C.

^{#3} Guideline varies with chloride. Values shown based on chloride range of 115 mg/L to 146 mg/L.

^{#4} Guideline varies with pH. Values

"-" No applicable guideline.

"ND" Non-detected.

BOLD - Greater than Tier 1 Guideline.

N/A - Not applicable.

Table 4: Surface Water Analytical Results

Parameter	Unit	Guideline ¹	SW-01 DOWNSTREAM	SW-01 DOWNSTREAM	SW-01 DOWNSTREAM	SW-01	SW-02 UPSTREAM	SW-02 UPSTREAM	SW-02 UPSTREAM	SW-02
			13 Jul 2021	09 Sep 2021	10 Nov 2022	07 Sep 2024	13 Jul 2021	09 Sep 2021	10 Nov 2022	07 Sep 2024
Volatile Organic Compounds (VOCs)										
Bromobenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Bromochloromethane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Bromodichloromethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Bromoforn	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Bromomethane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
n-Butylbenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
sec-Butylbenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
tert-Butylbenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Carbon tetrachloride	mg/L	0.0133	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050
Chlorobenzene	mg/L	0.0013	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Chloroethane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Chloroform	mg/L	0.0018	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Chloromethane	mg/L	-	<0.0010	<0.0010	<0.005	<0.0050	<0.0010	<0.0010	<0.005	<0.0050
2-Chlorotoluene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
4-Chlorotoluene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Dibromochloromethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2-Dibromo-3-chloropropane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,2-Dibromoethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Dibromomethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2-Dichlorobenzene	mg/L	0.0007	<0.00050	<0.00050	<0.0005	<0.00050	<0.00050	<0.00050	<0.0005	<0.00050
1,3-Dichlorobenzene	mg/L	0.15	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,4-Dichlorobenzene	mg/L	0.026	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,1-Dichloroethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2-Dichloroethane	mg/L	0.1	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,1-Dichloroethene	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2-Dichloroethene (cis)	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,2-Dichloroethene (trans)	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Dichlorodifluoromethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2-Dichloropropane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,3-Dichloropropane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
2,2-Dichloropropane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,1-Dichloropropene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,3-Dichloropropene	mg/L	-	-	-	<0.0015	<0.0015	-	-	<0.0015	<0.0015
1,3-Dichloropropene [cis]	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,3-Dichloropropene [trans]	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Hexachlorobutadiene	mg/L	0.0013	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
p-Isopropyltoluene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Methyl t-Butyl Ether (MTBE)	mg/L	10	-	-	<0.0005	<0.00050	-	-	<0.0005	<0.00050
Methylene Chloride	mg/L	0.0981	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
iso-Propylbenzene (cumene)	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
n-Propylbenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,1,1,2-Tetrachloroethane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,1,1,2,2-Tetrachloroethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Tetrachloroethene	mg/L	0.11	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2,3-Trichlorobenzene	mg/L	0.008	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,2,4-Trichlorobenzene	mg/L	0.024	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,1,1-Trichloroethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,1,2-Trichloroethane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Trichloroethene	mg/L	0.021	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
Trichlorofluoromethane	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Trihalomethanes	mg/L	-	-	-	<0.002	<0.0020	-	-	<0.002	<0.0020
1,2,3-Trichloropropane	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010
1,2,4-Trimethylbenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
1,3,5-Trimethylbenzene	mg/L	-	<0.0010	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.001	<0.0010
Vinyl chloride	mg/L	-	<0.00050	<0.00050	<0.001	<0.0010	<0.00050	<0.00050	<0.001	<0.0010

Notes:

SW-01 is downstream and SW-02 is upstream.

¹ Government of Alberta. 2018. Environmental Quality Guidelines for Alberta Surface Waters. Water Policy Branch, Alberta Environment and Parks. Edmonton, Alberta. Table 1 Surface water quality guidelines for the protection of freshwater aquatic life (PAL). Most conservative values applied (chronic or acute).

^{#1} Guideline varies with hardness. Values shown based on hardness range of 414 mg/L to 573 mg/L.

^{#2} Guideline varies with pH and temperature. Values shown based on pH range of 8.15 to 8.49 and temperature range of 13.9°C to 16.7°C.

^{#3} Guideline varies with chloride. Values shown based on chloride range of 115 mg/L to 146 mg/L.

^{#4} Guideline varies with pH. Values

"-" No applicable guideline.

"ND" Non-detected.

BOLD - Greater than Tier 1 Guideline.

N/A - Not applicable.

Table 5: Soil Vapour Monitoring Results

Parameter	Gas Well																						
	VW-01							24VW-01	VW-02							VW-03		VW-04 ⁴					25VW-04
	Aug-13	Jun-19	Dec-19	Jul-21	Nov-21	Dec-22	Jun-23	Dec-24	Aug-13	Jun-19	Dec-19	Jul-21	Nov-21	Dec-22	Dec-24	Aug-13	Jun-19	Jul-21	Nov-21	Dec-22	Jun-23	Dec-24	Feb-25
Total Drilled Depth (m)	3.5							3.5	6.1							7.6		4.0					2.5
Top of Screen Interval (mbg)	3.2							3.2	5.80							7.3		2.5					1
Bottom of Screened Interval (mbg)	3.5							3.5	6.10							7.6		4.0					2.5
Stick up (m)	0.84							0.83	0.92							0.00		-0.02					0.98
Pressure (kPa) ¹		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0		0.0
CH ₄ (%)	26.0	11.7	0.0	5.1	3.9	0.0		0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		4.1	2.0	30.3	9.7		0.7
CO (ppm) ²	0.0	8.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		2.0	0.0	11.0	2.0		1.0
CO ₂ (%)	13.1	13.7	0.2	17.7	17.7	0.8	Blinded	1.2	4.6	0.1	0.2	0.1	0.1	0.2	0.7	1.9	Destroyed	9.7	5.1	20.3	18.9	Destroyed	7.0
O ₂ (%)	8.4	3.3	20.9	0.2	5.0	22.1		20.1	17.2	19.9	21.3	20.6	22.7	22.5	20.4	19.8		12.4	16.8	1.6	2.8		12.7
Balance (% v/v)	52.5	71.3	78.8	77.1	73.5	77.1		78.2	77.8	80.1	78.4	79.3	77.2	77.3	79.0	78.3		73.8	76.1	47.7	69.0		79.6
Static Water Level (mbtoc) ³	-	Dry	Dry	Dry	Dry	CNM	3.65	Dry	-	Dry	Dry	Dry	Dry	Dry	Dry	Dry		1.30	1.84	1.71	1.65		Dry ⁵

Notes:

¹ Kpa - Kilopascal.

² ppm - Parts per million.

³ mbtoc - Meters below top of casing.

⁴ mbtoc - Well blinded during July and November 2021 - results may not be valid.

⁵ Oil recorded at bottom of well.

CNM - Could not measure.

Table 6: Soil Vapour Analytical Results

Location Code Field ID Sample Date Lab Report Number Laboratory ID	Generic Soil Vapour Criteria - Residential Coarse- Grained ¹	VW-01						VW-02		VW-03	VW-04				
		VW-01	VW-01	19DUP01	VW-01	24VW-01	DUPLICATE	VW-02	VW-02	VW-03	VW-04	DUPLICATE	VW-04	25VW-04	
		2-Aug-2013	5-Dec-2019	5-Dec-2019	23-Nov-2021	03 Dec 2024	03 Dec 2024	3-Aug-2013	5-Dec-2019	2-Aug-2013	23-Nov-2021	23-Nov-2021	09-Dec-2022	26 Feb 2025	
		B3C8546	L2393599	L2393599	L2671038	CG2417906	CG2417906	B3C8546	L2393599	B3C8546	L2671038	L2671038	CG2217083	CG2502145	
		SN8304 / SN8076-01	L2393599-1 / L2393599-4	L2393599-3	L2671038-1	CG2417906-001	CG2417906-002	SN8568 / SN8077-01	L2393599-2 / L2393599-5	SN8305 / SN8148-01	L2671038-2	L2671038-3	CG2217083-1	CG2502145-001	
Parameter	Units	µg/m ³													
Field Testing															
Air Volume	L	NG	-	0.06	-	-	-	-	0.06	-	-	-	-	-	-
Initial Pressure / Pressure on Receipt	in Hg	NG	-2.85	-11.4	-9.6	15	-8.99	-11.6	-7.33	-4.9	-6.92	-11	-4	-10.2	-11.2
Aliphatic/Aromatic PHC Sub-Fractionation															
Aliphatics (C ₆ -C ₈)	µg/m ³	740,737	88,300	56,400	56,200	-	24,600	25,800	2,990	1,300	34	-	-	447,000	24,800
Aliphatics (>C ₈ -C ₁₀)	µg/m ³	40,257	<480	21,500	21,100	-	13,700	14,300	577	728	73.1	-	-	931	24,200
Aliphatics (>C ₁₀ -C ₁₂)	µg/m ³	40,257	664	9,920	9,690	-	10,500	10,700	345	179	202	-	-	135	7,030
Aliphatics (>C ₁₂ -C ₁₆)	µg/m ³	40,257	<480	880	840	-	<710	<659	106	<30	105	-	-	<30	202
Aromatics (C ₉ -C ₈)	µg/m ³	740,737	-	-	-	-	<721	<670	-	-	-	-	-	2,340	137
Aromatics (>C ₉ -C ₁₀)	µg/m ³	805	<480	<390	<360	-	<721	<670	44.8	<15	30.9	-	-	189	1,760
Aromatics (>C ₁₀ -C ₁₂)	µg/m ³	8,051	<480	490	470	-	1,030	1,080	78.4	<15	58.1	-	-	41	1,090
Aromatics (>C ₁₂ -C ₁₆)	µg/m ³	8,051	<480	<770	<730	-	<1,440	<1,340	<5.0	<30	<5.00	-	-	<30	<149
CWS TVOC															
CWS TVOC (C ₆ -C ₈)	µg/m ³	NG	-	-	-	-	24,600	25,800	-	-	-	-	-	449,000	24,900
CWS TVOC (>C ₈ -C ₁₀)	µg/m ³	NG	-	-	-	-	13,700	14,300	-	-	-	-	-	1120	26,000
CWS TVOC (>C ₁₀ -C ₁₂)	µg/m ³	NG	-	-	-	-	11,500	11,800	-	-	-	-	-	176	8120
CWS TVOC (>C ₁₂ -C ₁₆)	µg/m ³	NG	-	-	-	-	<1,440	<1,340	-	-	-	-	-	<30	202
Linear & Cyclic Methyl Siloxanes															
Hexamethylcyclotrisiloxane, D3(CVMS)	µg/m ³	NG	192.7	<170	-	-	-	-	84.4	<170	14.6	-	-	-	-
Octamethylcyclotetrasiloxane, D4(CVMS)	µg/m ³	NG	73.9	<170	-	-	-	-	29.9	<170	23.4	-	-	-	-
Decamethylcyclopentasiloxane, D5(CVMS)	µg/m ³	NG	34.9	<170	-	-	-	-	32.1	<170	42.0	-	-	-	-
Dodecamethylcyclohexasiloxane, D6(CVMS)	µg/m ³	NG	<53.1	<170	-	-	-	-	145.4	<170	151.3	-	-	-	-
Hexamethyldisiloxane, MM(LVMS)	µg/m ³	NG	<2.10	<170	-	-	-	-	<1.00	<170	<0.10	-	-	-	-
Octamethyltrisiloxane, MDM(LVMS)	µg/m ³	NG	<4.10	<170	-	-	-	-	<1.90	<170	<0.20	-	-	-	-
Decamethyltetrasiloxane, MD2M(LVMS)	µg/m ³	NG	<5.30	<170	-	-	-	-	<2.50	<170	<0.30	-	-	-	-
Dodecamethylpentasiloxane, MD3M(LVMS)	µg/m ³	NG	<52.8	<170	-	-	-	-	<24.9	<170	<3.00	-	-	-	-
Hydrocarbons															
Benzene	µg/m ³	41	<54.6*	<16	<15	<15	18.8	96.8	16.5	1.4	2.51	20	<15	<65.5*	28.8
Toluene	µg/m ³	75,190	<304	<19	<17	<36	13.4	66.3	18.1	1.31	14.8	<36	<36	<21.9	4.07
Ethylbenzene	µg/m ³	68,650	<119	<22	<20	<42	2.47	4.69	3.24	<0.87	3.98	<42	<42	<21.0	50.4
Xylenes (m & p)	µg/m ³	NG	<428	<43	<39	<84	6.9	11.3	8.23	<1.7	15.8	<84	<84	92.0	265
Xylene (o)	µg/m ³	NG	<82.5	<22	<20	<42	5.17	6.6	5.29	<0.87	7.23	<42	<42	21.0	228
Xylenes Total	µg/m ³	3,520	<429	<48	<43	<96	12.1	17.9	13.5	<2.0	23.1	<96	<96	113	493
Styrene	µg/m ³	3,220	181	<21	<19	<41	<0.85	1.7	<0.852	<0.85	1.57	<41	<41	<41.2	<4.60
Total BTEX	µg/m ³	NG	-	-	-	-	46.8	186	-	-	-	-	-	<171	576
F1 (C ₆ -C ₁₀)	µg/m ³	867,383	142,020	62,900	62,500	63,900	35,600	37,200	3,946	1,720	148	4980	3540	404,000	44,600
F2 (C ₁₀ -C ₁₆)	µg/m ³	52,495	1,384	19,300	18,900	67,500	14,900	15,500	531.9	380	367.6	<720	<720	303	10,700
Alcohols															
Isopropanol	µg/m ³	6,219	<701	<61	<56	-	-	-	8.94	<2.5	12.4	-	-	-	-
High Level Fixed Gases															
Nitrogen	%	NG	52.5	66.3	69.8	-	73.1	69.7	77.8	74.9	78.3	75.7	76.6	-	79.4
Oxygen	%	NG	8.4	7.04	7.49	-	14.9	13.4	17.2	20.3	19.8	18.0	19.6	3.63	14.0
Carbon Dioxide	%	NG	13.1	11.1	11.5	12.9	4.94	5.81	4.6	0.391	1.9	4.06	2.77	16.6	5.56
Carbon Monoxide	%	NG	<0.20	<0.050	<0.050	<0.050	<0.050	<0.050	<0.30	<0.050	<0.30	<0.050	<0.050	0.072	<0.050
Methane	%	NG	26	5.26	5.46	2.03	1.45	1.78	<0.30	<0.050	<0.30	2.21	1.47	33.8	0.648
Hydrocarbon Gases (C₁-C₅)															
Methane	%	NG	-	-	-	-	-	-	0.0067	0.00333	<0.00068	-	-	-	-
Ethane	%	NG	0.00011	<0.00020	<0.00020	<0.00020	-	-	<0.00028	<0.00020	<0.00034	0.00067	0.00044	-	-
Ethene	%	NG	0.00067	0.00026	0.00025	<0.00020	-	-	<0.00028	<0.00020	<0.00034	<0.00020	<0.00020	-	-
Propane	%	NG	0.000034	<0.00020	<0.00020	<0.00020	-	-	<0.00028	<0.00020	<0.00034	<0.00020	<0.00020	-	-
Propene	%	NG	0.000022	<0.00020	<0.00020	<0.00020	-	-	<0.00028	<0.00020	<0.00034	<0.00020	<0.00020	-	-
Butane	%	NG	0.00024	<0.00020	<0.00020	<0.00020	-	-	<0.00056	<0.00020	<0.00068	<0.00020	<0.00020	-	-
Pentane	%	NG	0.0014	0.00021	0.0002	<0.00020	-	-	<0.00028	<0.00020	<0.00034	<0.00020	<0.00020	-	-
Polycyclic Aromatic Hydrocarbons (PAHs)															
Naphthalene	µg/m ³	380	-	<66	<60	<50	4.14	4.46	-	<2.6	-	<50	<50	<25.3	6.24
Volatile Organic Compounds (VOCs)															
1,1,1-Trichloroethane	µg/m ³	1,693,510	<155	<27	<25	<52	<1.1	<1.2	18.8	<1.1	<1.64	<52	<52	<52.7	<5.9
1,1,2,2-Tetrachloroethane	µg/m ³	11	<130*	<34*	<31*	<66*	<1.6	<1.8	<1.37	<1.4	<1.37	<66*	<66*	<66.3*	<7.4
1,1,2-Trichloroethane	µg/m ³	7	<77.7*	<27*	<25*	<52*	<1.1	<1.2	<0.818	<1.1	<0.818	<52*	<52*	<52.7*	<5.9
1,1-Dichloroethane	µg/m ³	430	<76.9	<20	<18	<39	<0.81	<0.93	<11.1	<0.81	<0.809	<39	<39	<42.3*	<4.37
1,1-Dichloroethene	µg/m ³	6,470	<94.2	<20	<18	<38	<0.79	<0.91	5.6	<0.79	<0.991	<38	<38	<38.3	<4.28
1,2,4-Trichlorobenzene	µg/m ³	365	<1,410*	<37	<34	<71	<1.5	<1.7	<14.8	<1.5	<14.8	<71	<71	<71.7	<8.0
1,2,4-Trichlorobenzene	µg/m ³	2,235	<233	<25	<22	<47	4	4	11.3	<0.98	13.5	<47	<47	<47.5	102
1,2-Dibromoethane	µg/m ³	2.2	<124*	<38*	<35*	<74*	<1.5	<1.8	<1.31	<1.5	<1.31	<74*	<74*	<74.2*	<8.3
1,2-Dichlorobenzene	µg/m ³	7,072	<228	<30	<27	<58	<1.2	<1.4	<2.40	<1.2	<2.40	<58	<58	<58.1	<6.5
1,2-Dichloroethane	µg/m ³	24	<76.9*	45.0	33.0	<39*	10	11.4	<0.809	<0.81	<0.809	<39*	<39*	<39.1*	6.48
1,2-Dichloroethene (cis)	µg/m ³	242	486	34	22.0	<38	7.73	9.32	52.3	<0.79	1.68	<38	<38	50.0	<4.28
1,2-Dichloroethene (trans)	µg/m ³	1,400	118	24	<18	<38	2.5	2.78	<0.793	<0.79	<0.793	<38	<38	50.0	4.76
1,2-Dichloropropane	µg/m ³	135	<176*	<23	<21	<44	<0.9	<1.1	<1.85	<0.92	<1.85	<44	<44	<44.6	<5.0
1,2-Dichlorotetrafluoroethane	µg/m ³	566,335	<113	65	47	<67	1.9	2	240	7.6	4.07	230	181	669	58
1,3,5-Trimethylbenzene	µg/m ³	2,235	<233	172	126	<129	135	146	19.9	<0.98	<9.29	<47	<47	<47.5	436
1,3-Butadiene	µg/m ³	17	<105*	<11	<10	<21*	<4.64	<5.75	<1.11	<0.44	<1.11	<21*	<21*	<23.7*	<2.39
1,3-Dichlorobenzene	µg/m ³	64	<228*	<30	<27	<58	<1.2	<1.4	<2.40	<1.2	<2.40	<58	<58	<58.1	<6.5
1,3-Dichloropropene	µg/m ³	NG	-	-	-	-	<1.8	<2							

Table 7: Chemical, Physical, and Toxicological Properties

Parameter	TC	RsC	H'	D _{air}	D _{water}	BAF	MF			
	Tolerable mg/m ³	Risk-specific mg/m ³	Unitless Henry's unitless	Pure component cm ² /s	Pure component cm ² /s	Bioattenuation unitless	Mass Fraction in unitless	Mass Fraction in unitless	Mass Fraction in unitless	
Benzene	--	0.003	0.225	0.088	1.00E-05	10	--	--	--	
Toluene	3.8	--	0.274	0.087	9.20E-06	10	--	--	--	
Ethylbenzene	1	--	0.358	0.075	8.50E-06	10	--	--	--	
Xylenes	0.18	--	0.252	0.078	9.90E-06	10	--	--	--	
Naphthalene	0.003	--	0.017	0.059	7.50E-06	10	--	--	--	
F1	Aliphatic C>6-C8	18.4	--	50	0.05	0.00001	10	0.55	0.854	0.842
	Aliphatic C>8-C10	1	--	80	0.05	0.00001	10	0.36	0.141	0.153
	Aromatic C>8-C10	0.2	--	0.48	0.05	0.00001	10	0.09	0.005	0.005
F2	Aliphatic C>10-C12	1	--	120	0.05	0.00001	10	0.36	0.767	0.766
	Aliphatic C>12-C16	1	--	520	0.05	0.00001	10	0.44	0.205	0.206
	Aromatic C>10-C12	0.2	--	0.14	0.05	0.00001	10	0.09	0.023	0.023
	Aromatic C>12-C16	0.2	--	0.053	0.05	0.00001	10	0.11	0.005	0.005
1,1,1-Trichloroethane	5	--	0.688	0.078	0.000009	10	--	--	--	
1,1,2,2-Tetrachloroethane	--	0.000172	0.019	0.071	0.000008	10	--	--	--	
1,1,2-Trichloroethane	0.0002	0.000625	0.038	0.078	0.000009	10	--	--	--	
1,1-Dichloroethane	--	0.006250	0.240	0.074	0.000011	10	--	--	--	
1,1-Dichloroethene	0.2	--	0.942	0.090	0.000010	10	--	--	--	
1,2,4-Trichlorobenzene	0.007	--	0.112	0.030	0.000008	10	--	--	--	
1,2,4-Trimethylbenzene	0.06	--	0.230	0.061	0.000008	10	--	--	--	
1,2-Dibromoethane	0.0093	0.016700	0.027	0.022	0.000012	10	--	--	--	
1,2-Dichlorobenzene	0.2	--	0.072	0.069	0.000008	10	--	--	--	
1,2-Dichloroethane	0.007	0.000385	0.049	0.104	0.000010	10	--	--	--	
1,2-Dichloropropane	0.004	0.002703	0.110	0.078	0.000009	10	--	--	--	
1,3,5-Trimethylbenzene	0.06	--	0.359	0.060	0.000008	10	--	--	--	
1,3-Butadiene	0.002	0.000333	3.009	0.249	0.000011	10	--	--	--	
1,3-Dichlorobenzene	0.095	0.000909	0.128	0.069	0.000008	10	--	--	--	
1,4-Dichlorobenzene	0.095	0.000909	0.098	0.069	0.000008	10	--	--	--	
1,4-Dioxane	0.03	0.002000	0.000	0.229	0.000010	10	--	--	--	
2-Hexanone	0.03	--	0.004	0.070	0.000008	10	--	--	--	
Acetone	31	--	0.002	0.124	0.000011	10	--	--	--	
Allyl chloride	0.001	--	0.450	0.094	0.000011	10	--	--	--	
Benzyl chloride	0.001	--	0.017	0.075	0.000008	10	--	--	--	
Bromodichloromethane	--	0.000270	0.098	0.030	0.000011	10	--	--	--	
Bromoform	--	0.009091	0.024	0.015	0.000010	10	--	--	--	
Bromomethane	0.005	--	0.255	0.073	0.000012	10	--	--	--	
Carbon Disulfide	0.7	--	0.705	0.104	0.000010	10	--	--	--	
Carbon Tetrachloride	0.1	0.001667	1.183	0.078	0.000009	10	--	--	--	
Chlorobenzene	0.01	--	0.148	0.073	0.000009	10	--	--	--	
Chloroethane	1	--	0.073	0.271	0.000012	10	--	--	--	
Chloroform	0.098	0.000435	0.154	0.104	0.000010	10	--	--	--	
Chloromethane	0.09	--	0.388	0.126	0.000007	10	--	--	--	
cis-1,2-Dichloroethene	0.007	--	0.302	0.074	0.000011	10	--	--	--	
cis-1,3-Dichloropropene	0.02	0.002500	0.053	0.087	0.000010	10	--	--	--	
Cyclohexane	6	--	7.618	0.080	0.000009	10	--	--	--	
Dibromochloromethane	0.07	--	0.040	0.020	0.000011	10	--	--	--	
Dichlorodifluoromethane	0.1	--	16.475	0.067	0.000010	10	--	--	--	
4-Ethyltoluene	0.40	--	0.205	0.065	0.000007	10	--	--	--	
Ethyl acetate	0.07	--	0.006	0.067	0.000010	10	--	--	--	
Freon 113	5	--	21.500	0.038	0.000009	10	--	--	--	
Freon 114	17	--	115.000	0.082	0.000009	10	--	--	--	
Heptane	0.4	--	83.709	0.065	0.000007	10	--	--	--	
Hexachlorobutadiene	--	0.000455	0.421	0.027	0.000007	10	--	--	--	
Isooctane	0.4	--	30.500	0.060	0.000007	10	--	--	--	
Isopropyl alcohol	0.2	--	0.000331	0.103	0.000011	10	--	--	--	
Isopropylbenzene	0.4	--	0.591	0.065	0.000007	10	--	--	--	
Methyl ethyl ketone	5	--	0.001	0.081	0.000010	10	--	--	--	
Methyl isobutyl ketone	0.003	--	0.006	0.075	0.000008	10	--	--	--	
Methylene chloride	0.6	1	0.151	0.101	0.000012	10	--	--	--	
MTBE	0.037	--	0.028	0.102	0.000011	10	--	--	--	
n-Hexane	0.7	--	73.916	0.200	0.000008	10	--	--	--	
Propylene	3	--	8.013	0.110	0.000011	10	--	--	--	
Styrene	0.092	--	0.130	0.071	0.000008	10	--	--	--	
Tetrachloroethylene	0.36	0.038462	1.077	0.072	0.000008	10	--	--	--	
Tetrahydrofuran	2	--	0.003	0.099	0.000011	10	--	--	--	
trans-1,2-Dichloroethene	--	--	0.277	0.071	0.000012	10	--	--	--	
trans-1,3-Dichloropropene	0.02	0.002500	0.053	0.087	0.000010	10	--	--	--	
Trichloroethylene	0.04	0.002439	0.477	0.079	0.000009	10	--	--	--	
Trichlorofluoromethane	1.05	--	5.200	0.087	0.000010	10	--	--	--	
Vinyl acetate	0.2	--	0.024	0.085	0.000009	10	--	--	--	
Vinyl bromide	0.003	--	0.260	0.100	0.000012	10	--	--	--	
Vinyl chloride	0.1	0.002273	3.236	0.106	0.000012	10	--	--	--	
Hydrogen Sulfide	0.002	--	0.350	0.188	0.000022	10	--	--	--	

Notes:
 cm²/s Square centimetres per second.
 F1 Fraction 1 (C6-C10).
 F2 Fraction 2 (C>10-C16).
 mg/m³ Milligrams per cubic metre.
 PHC Petroleum hydrocarbon.
 -- Not applicable.

References: Canadian Council of Ministers of the Environment (CCME). 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.
 Alberta Environment and Protected Areas (EPA). 2024. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.
 Health Canada. 2021. Federal contaminated site risk assessment in Canada: Toxicological reference values (TRVs), Version 3.0.
 United States Environmental Protection Agency (US EPA). 2024. Regional Screening Levels for Chemical Contaminants at Superfund Sites.

Table 8: Soil Properties for Evaluation of Vapour Transport

Parameter		Units	Coarse-Grained Soil	Fine-Grained Soil
θ_a	Vapour-filled porosity	unitless	0.31	0.303
ρ_b	Dry bulk density	g/cm^3	1.7	1.4
n	Total soil porosity	unitless	0.36	0.47
θ_w	Moisture-filled porosity	unitless	0.05	0.167
Q_{soil}	Soil gas flow rate	cm^3/s	167	16.7

Notes:

Values from CCME (2014).

cm Centimetre.

cm^2 Square centimetre.

g/cm^3 Grams per cubic centimetre.

PHC Petroleum hydrocarbon.

References: Canadian Council of Ministers of the Environment (CCME). 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.

Alberta Environment and Protected Areas (EPA). 2024. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

Table 9: Building Properties for Evaluation of Vapour Transport

Parameter		Units	Residential/Parkland Land Use
L_B	Building length	cm	1,225
W_B	Building width	cm	1,225
A_B	Building area exposed to soil, including basement wall area	cm ²	2.70E+06
H_B	Building height	cm	360
L_{crack}	Thickness of the foundation	cm	11.25
A_{crack}	Area of cracks through which contaminant vapours enter the building	cm ²	994.5
ACH	Air exchanges per hour	h ⁻¹	0.5

Notes:

Values taken from CCME (2014).

cm Centimetre.

cm² Square centimetre.

h⁻¹ Per hour.

References: Canadian Council of Ministers of the Environment (CCME). 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.
 Alberta Environment and Protected Areas (EPA). 2024. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

Table 10: Generic Soil Vapour Criteria

Parameter	Residential/Parkland			
	Units	Coarse-Grained	Units	Coarse-Grained
Benzene		0.041		41.0
Toluene		75.2		75,190
Ethylbenzene		68.7		68,650
Xylenes		3.52		3,520
PHC F1		867		867,380
PHC F2		52.5		52,500
Naphthalene		0.38		1,694,000
1,1,1-Trichloroethane		1,694		1,693,510
1,1,2,2-Tetrachloroethane		0.011		11.2
1,1,2-Trichloroethane		0.0070		7.00
1,1-Dichloroethane		0.43		430
1,1-Dichloroethene		6.47		6,470
1,2,4-Trichlorobenzene		0.36		365
1,2,4-Trimethylbenzene		2.23		2,235
1,2-Dibromoethane		0.0022		2.16
1,2-Dichlorobenzene		7.07		7,072
1,2-Dichloroethane		0.020		23.9
1,2-Dichloroethene (cis)		0.24		242
1,2-Dichloroethene (trans)		1.40		1,400
1,2-Dichloropropane		0.14		135
1,3,5-Trimethylbenzene		2.23		2,235
1,3-Butadiene		0.020		17.3
1,3-Dichlorobenzene		0.060		64.3
1,3-Dichloropropene [cis]		0.16		163
1,3-Dichloropropene [trans]		0.15		149
1,4-Dichlorobenzene		0.064		64.0
1,4-Dioxane		0.11		105
1-Methyl-4 ethyl benzene		14.5		14,461
2-Butanone (MEK)		167		167,364
2-Hexanone (MBK)		1.05		1,053
4-Methyl-2-pentanone (MIBK)		103		102,977
Acetone		919		918,788
Allyl chloride	mg/m ³	0.030	µg/m ³	32.0
Benzyl chloride		0.030		34.3
Bromodichloromethane		0.030		28.3
Bromoform		1.49		1,494
Bromomethane		0.17		173
Carbon disulfide		21.7		21,713
Carbon tetrachloride		0.11		113
Chlorobenzene		0.35		347
Chloroethane		124		124,080
Chloroform		0.030		27.0
Chloromethane		2.66		2,657
Cyclohexane		202		201,510
Dibromochloromethane		6.07		6,070
Dichlorodifluoromethane		3.58		3,584
Ethyl acetate		2.51		2,509
Freon 113		231		230,627
Freon 114		566		566,335
Heptane		14.5		14,461
Hexachlorobutadiene		0.050		50.7
Hexane		18.8		18,839
Isooctane		14.9		14,917
iso-Propylbenzene (cumene)		14.5		14,461
Isopropanol		6.22		6,219
Methyl t-Butyl Ether (MTBE)		1.15		1,153
Methylene Chloride		18.8		18,764
Propylene		91.7		91,723
Styrene		3.22		3,220
Tetrachloroethene		1.39		1,390
Tetrahydrofuran		62.8		62,828
Trichloroethene		0.070		70.0
Trichlorofluoromethane		34.3		34,325
Vinyl acetate		6.59		6,586
Vinyl bromide (bromoethene)		0.040		40.0
Vinyl chloride		0.070		70.0

Notes:

mg/m³ Milligrams per cubic metre.

µg/m³ Micrograms per cubic metre.

References:

¹ Canadian Council of Ministers of the Environment (CCME). 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures via Inhalation of Vapours.

² Alberta Environment and Protected Areas (EPA). 2024. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

³ Health Canada. 2021. Federal contaminated site risk assessment in Canada: Toxicological reference values (TRVs), Version 3.0.

⁴ United States Environmental Protection Agency (US EPA). 2024. Regional Screening Levels for Chemical Contaminants at Superfund Sites.

Table 12: Soil Vapour Quality Assurance/Quality Control Analytical Results

Parameter	Units	VW-01		RPD
		Location Code	Field ID	
		Sample Date	Lab Report Number	
		24VW-01	DUPLICATE	
		03 Dec 2024	CG2417906	
Laboratory ID	CG2417906-001	CG2417906-002		
Field Testing				
Pressure on receipt	Inches Hg	-8.99	-11.6	25
Aliphatic/Aromatic PHC Sub-Fractionation				
Aliphatics (C ₆ -C ₈)	µg/m ³	24,600	25,800	5
Aliphatics (>C ₈ -C ₁₀)	µg/m ³	13,700	14,300	4
Aliphatics (>C ₁₀ -C ₁₂)	µg/m ³	10,500	10,700	2
Aliphatics (>C ₁₂ -C ₁₆)	µg/m ³	<710	<659	-
Aromatics (C ₆ -C ₈)	µg/m ³	<721	<670	-
Aromatics (>C ₈ -C ₁₀)	µg/m ³	<721	<670	-
Aromatics (>C ₁₀ -C ₁₂)	µg/m ³	1030	1080	5
Aromatics (>C ₁₂ -C ₁₆)	µg/m ³	<1,440	<1,340	-
CWS TVOC				
CWS TVOC (C ₆ -C ₈)	µg/m ³	24,600	25,800	5
CWS TVOC (>C ₈ -C ₁₀)	µg/m ³	13,700	14,300	4
CWS TVOC (>C ₁₀ -C ₁₂)	µg/m ³	11,500	11,800	3
CWS TVOC (>C ₁₂ -C ₁₆)	µg/m ³	<1,440	<1,340	-
Hydrocarbons				
Benzene	µg/m ³	18.8	96.8	135
Toluene	µg/m ³	13.4	66.3	133
Ethylbenzene	µg/m ³	2.47	4.69	62
Xylene (o)	µg/m ³	5.17	6.6	24
Xylenes (m & p)	µg/m ³	6.9	11.3	49
Xylenes Total	µg/m ³	12.1	17.9	39
Styrene	µg/m ³	<0.85	1.7	-
Total BTEX	µg/m ³	46.8	186	120
F1 (C ₆ -C ₁₀)	µg/m ³	35,600	37,200	4
F2 (C ₁₀ -C ₁₆)	µg/m ³	14,900	15,500	4
High Level Fixed Gases				
Nitrogen	%	73.1	69.7	5
Oxygen	%	14.9	13.4	11
Carbon Dioxide	%	4.94	5.81	16
Carbon Monoxide	%	<0.050	<0.050	-
Methane	%	1.45	1.78	20
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	µg/m ³	4.14	4.46	7
Volatile Organic Compounds (VOCs)				
1,1,1-Trichloroethane	µg/m ³	<1.1	<1.2	-
1,1,2,2-Tetrachloroethane	µg/m ³	<1.6	<1.8	-
1,1,2-Trichloroethane	µg/m ³	<1.1	<1.2	-
1,1-Dichloroethane	µg/m ³	<0.81	<0.93	-
1,1-Dichloroethene	µg/m ³	<0.79	<0.91	-
1,2,4-Trichlorobenzene	µg/m ³	<1.5	<1.7	-
1,2,4-Trimethylbenzene	µg/m ³	4	4	0
1,2-Dibromoethane	µg/m ³	<1.5	<1.8	-
1,2-Dichlorobenzene	µg/m ³	<1.2	<1.4	-
1,2-Dichloroethane	µg/m ³	10	11.4	13
1,2-Dichloroethene (cis)	µg/m ³	7.73	9.32	19
1,2-Dichloroethene (trans)	µg/m ³	2.5	2.78	11
1,2-Dichloropropane	µg/m ³	<0.9	<1.1	-
1,2-Dichlorotetrafluoroethane	µg/m ³	1.9	2	5
1,3,5-Trimethylbenzene	µg/m ³	135	146	8
1,3-Butadiene	µg/m ³	<4.64	<5.75	-
1,3-Dichlorobenzene	µg/m ³	<1.2	<1.4	-
1,3-Dichloropropene	µg/m ³	<1.8	<2.1	-
1,3-Dichloropropene [cis]	µg/m ³	<0.9	<1.0	-
1,3-Dichloropropene [trans]	µg/m ³	<0.9	<1.0	-
1,4-Dichlorobenzene	µg/m ³	<1.2	<1.4	-
1,4-Dioxane	µg/m ³	<0.72	<0.83	-
1-Methyl-4 ethyl benzene	µg/m ³	2.9	3.1	7

Notes:

RDL - Reportable detection limit.

RPD - RPD is Relative Percentage Difference calculated as $RPD(\%) = \frac{|V1-V2|}{[(V1+V2)/2]} * 100$

where: V1, V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL and neither concentration is below the reported detection limit.

N/A - Not applicable.

BOLD - RPD value greater than 50%.

Table 12: Soil Vapour Quality Assurance/Quality Control Analytical Results

		VW-01		RPD
		24VW-01	DUPLICATE	
		03 Dec 2024	03 Dec 2024	
		CG2417906	CG2417906	
		CG2417906-001	CG2417906-002	
Parameter	Units			
Volatile Organic Compounds (VOCs)				
2-Butanone (MEK)	µg/m ³	<7.37	<10.3	-
2-Hexanone (MBK)	µg/m ³	<148	<186	-
4-Methyl-2-pentanone (MIBK)	µg/m ³	<0.82	<0.94	-
Acetone	µg/m ³	18.8	21.1	12
Allyl chloride	µg/m ³	<0.63	<0.72	-
Benzyl chloride	µg/m ³	<1.0	<1.2	-
Bromodichloromethane	µg/m ³	3.8	4	5
Bromoform	µg/m ³	<2.1	<2.4	-
Bromomethane	µg/m ³	<0.78	<0.89	-
Carbon disulfide	µg/m ³	<1.6	<1.8	-
Carbon tetrachloride	µg/m ³	<1.26	<1.45	-
Chlorobenzene	µg/m ³	<0.92	<1.06	-
Chloroethane	µg/m ³	0.55	<0.61	-
Chloroform	µg/m ³	<0.98	<1.12	-
Chloromethane	µg/m ³	1.92	1.98	3
Cyclohexane	µg/m ³	1,680	1,750	4
Dibromochloromethane	µg/m ³	<1.7	<2.0	-
Dichlorodifluoromethane	µg/m ³	4.4	4.4	0
Ethyl acetate	µg/m ³	<1.51	<2.16	-
Freon 113	µg/m ³	<1.5	<1.8	-
Heptane	µg/m ³	898	939	4
Hexachlorobutadiene	µg/m ³	<2.1	<2.4	-
Hexane	µg/m ³	3,770	3,980	5
Isooctane	µg/m ³	132	155	16
iso-Propylbenzene (cumene)	µg/m ³	2.1	2.3	9
Methyl t-Butyl Ether (MTBE)	µg/m ³	<0.72	<0.83	-
Methylene Chloride	µg/m ³	<0.69	<0.80	-
Propene	µg/m ³	57.3	63.5	10
Tetrachloroethene	µg/m ³	<1.4	<1.6	-
Tetrahydrofuran	µg/m ³	1.18	0.91	26
Trichloroethene	µg/m ³	1.4	1.8	25
Trichlorofluoromethane	µg/m ³	<1.1	<1.3	-
Vinyl acetate	µg/m ³	<422	<394	-
Vinyl bromide (bromoethene)	µg/m ³	<0.9	<1.0	-
Vinyl chloride	µg/m ³	242	256	6

Notes:

RDL - Reportable detection limit.

RPD - RPD is Relative Percentage Difference calculated as $RPD(\%) = \frac{|V1-V2|}{[(V1+V2)/2]} * 100$
 where: V1, V2 = concentrations of parent and duplicate sample, respectively.

"-" Indicates RPD not calculated. RPDs have only been considered where both concentrations are greater than 5 times the RDL and neither concentration is below the reported detection limit.

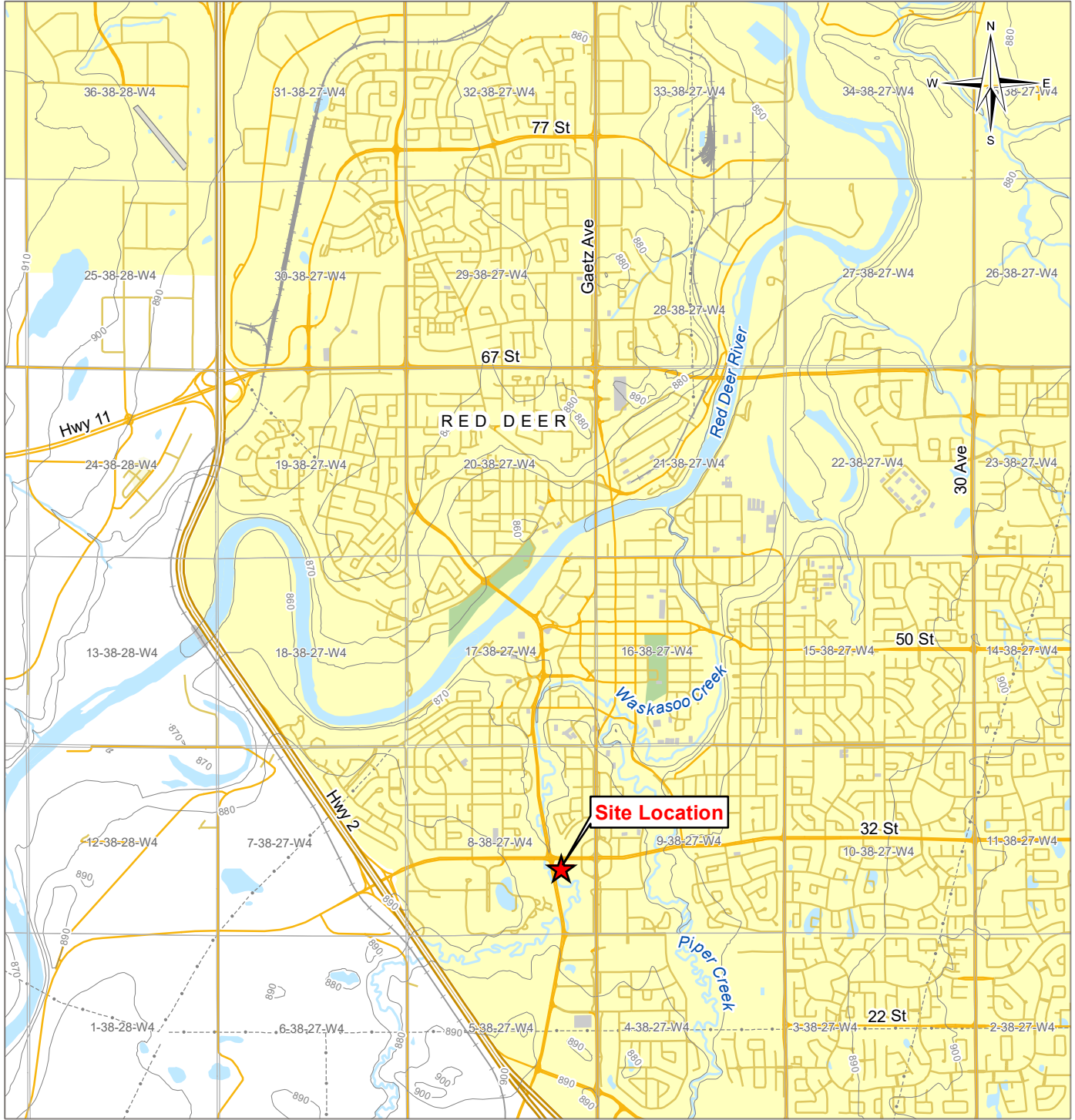
N/A - Not applicable.

BOLD - RPD value greater than 50%.

FIGURES

- Figure 1 Site Location Plan
- Figure 2 Site Plan and Surrounding Land Use
- Figure 3 Historical Groundwater Elevations (Groundwater Monitoring Wells)
- Figure 4 Groundwater Elevations – September 2024

G:\SOLID_ID_WASTE\SWOP\SWOP04071-04\GIS\Maps\004_Red_Deer_Motors\SWOP04071-04_Figure01_SiteLocation.mxd modified 4/14/2025 by MEGAN BURNS



LEGEND

- Site Location
- Highway
- Main Road
- Local Road
- Resource/Recreational Road
- Railway
- Power Line
- Runway
- Building
- Park
- Residential Area
- Contour (10 m)
- Watercourse
- Waterbody
- Urban Area

NOTES
Base data source: CanVec 1:50,000.

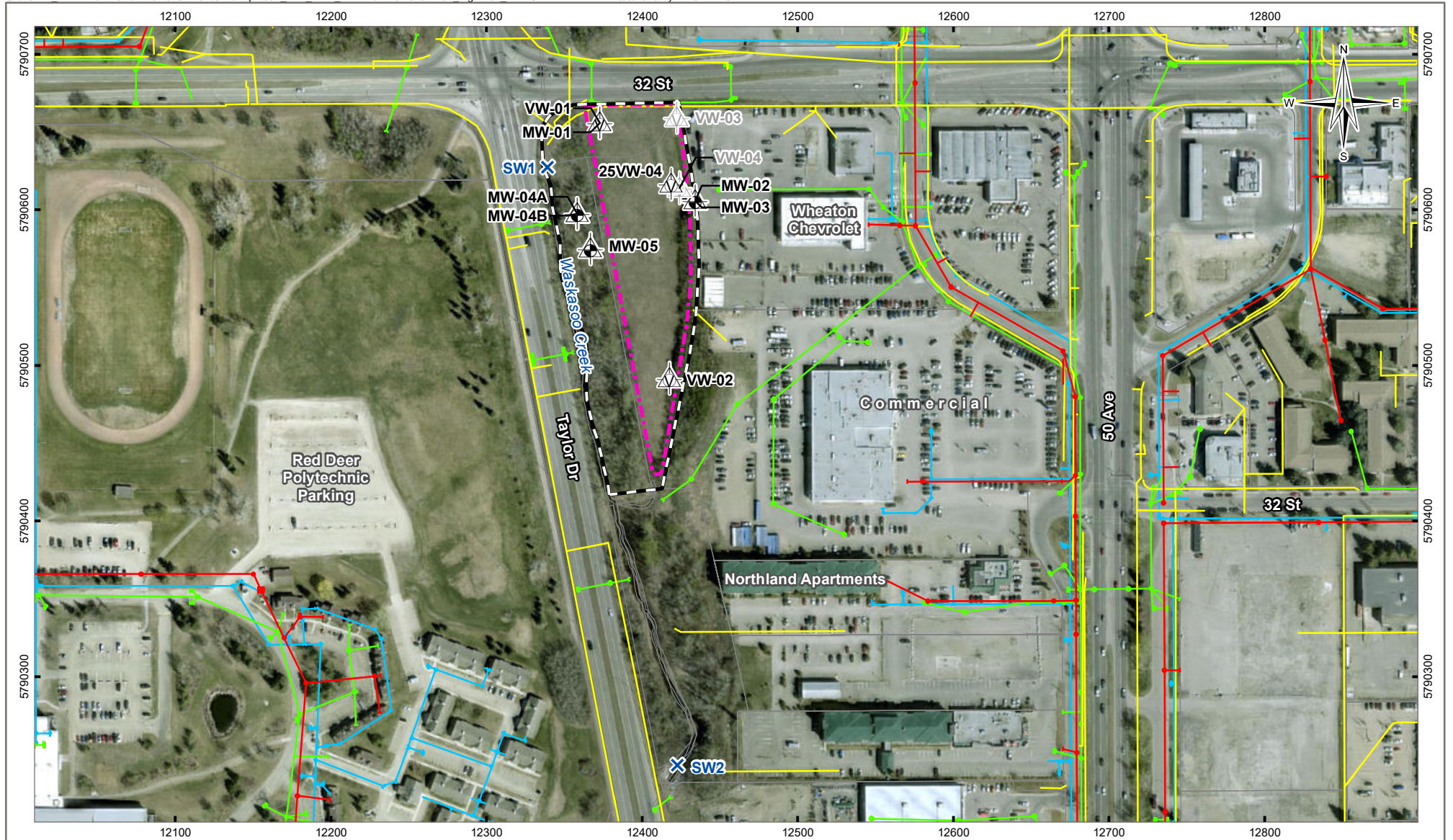
STATUS
ISSUED FOR REVIEW

**2024 GROUNDWATER AND SOIL VAPOUR MONITORING REPORT
RED DEER MOTORS**





Site Location Plan







PROJECTION 3TM 114		DATUM NAD83		CLIENT 	
Scale: 1:50,000					
FILE NO. SWOP04071-04_Figure01_SiteLocation.mxd					
OFFICE Tt-EDM	DWN MRB	CKD SL	APVD WC	REV 0	TETRA TECH
DATE April 14, 2025	PROJECT NO. SWM.SWOP04071-04.004				

Figure 1



LEGEND

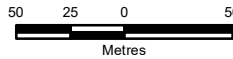
-  Monitoring Well
-  Vapour Well - Faded symbol indicates a destroyed well
-  Surface Water
-  Site Boundary

-  Historic Waste Disposal (Provided by Tiamat, 2014)
-  Lot Boundary
- Utilities**
-  Electrical
-  Sanitary
-  Storm
-  Water



NOTES
 Base data source: Imagery provided by ESRI; Red Deer County (2024)
 Roads from City of Red Deer Open Data, 2018
 Utilities provided by City of Red Deer.
 Locations have not been field verified, and should not be used for construction or other intrusive field activities.
 VW-03 was not located.

STATUS
 ISSUED FOR REVIEW

Scale: 1:3,500



Metres

PROJECTION 3TM 114	DATUM NAD83
FILE NO. SWOP04071-04_Figure02_LandUse.mxd	
CLIENT	
	

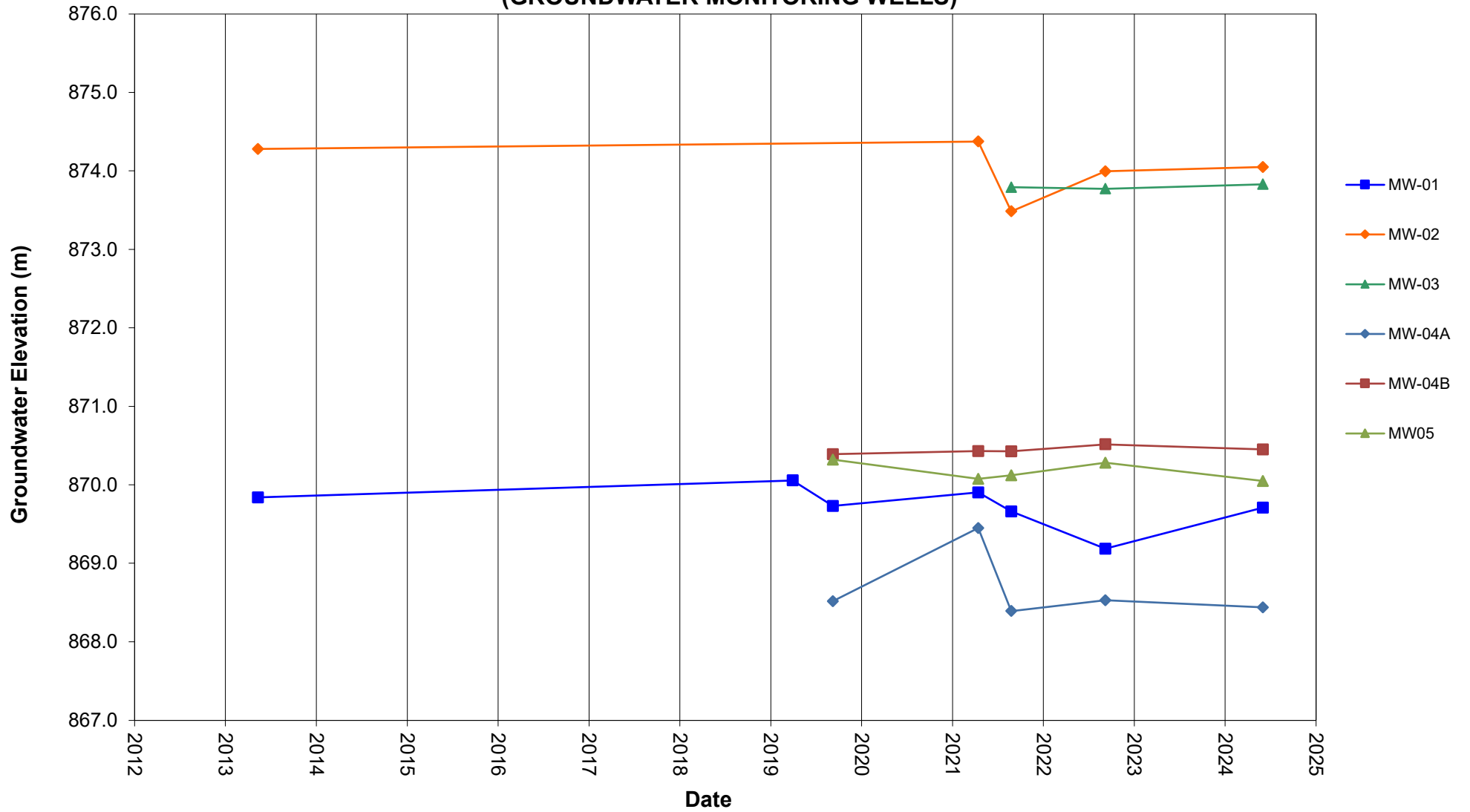
**2024 GROUNDWATER AND SOIL VAPOUR MONITORING REPORT
 RED DEER MOTORS**

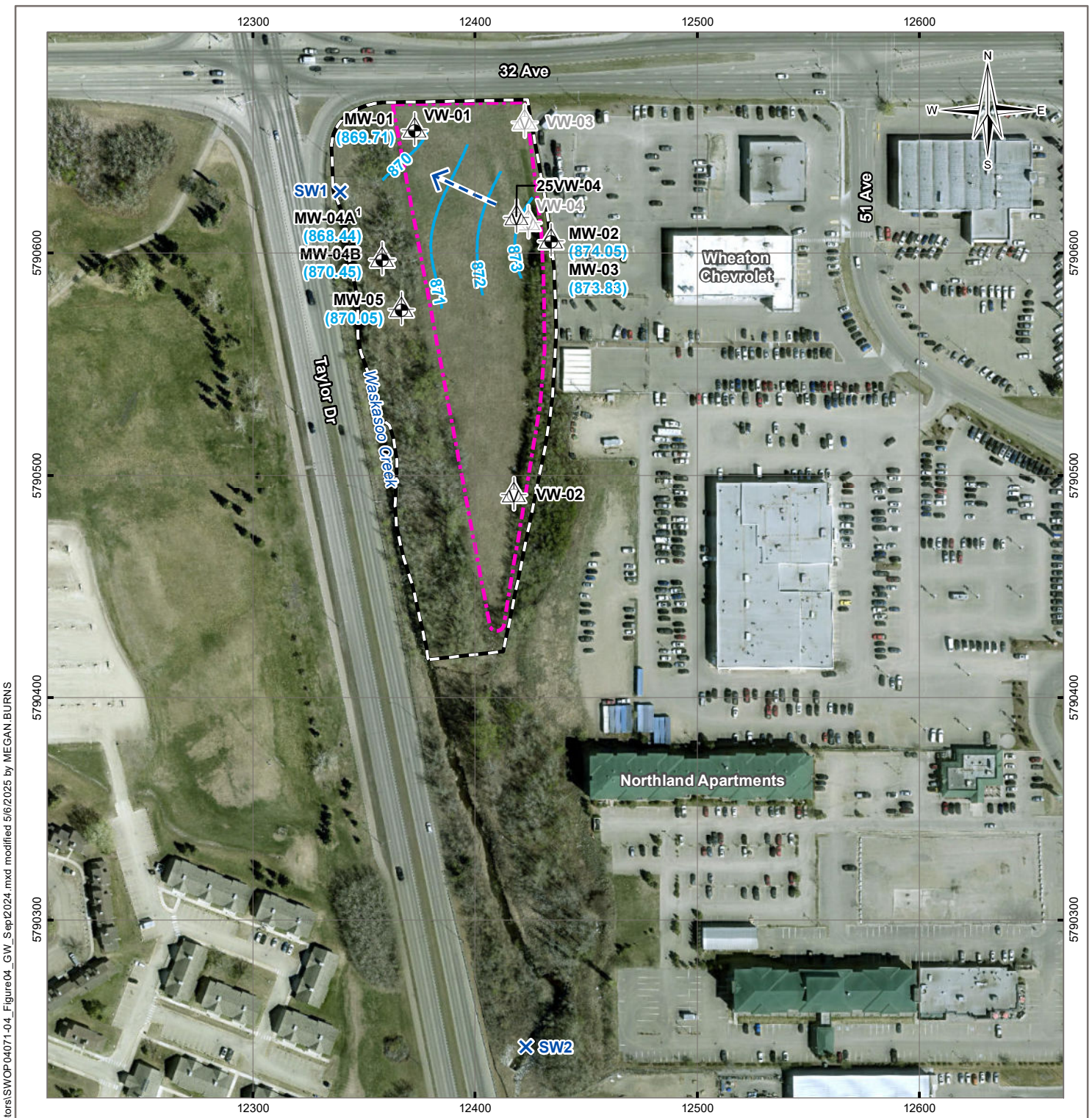
Site Plan and Surrounding Land Use

OFFICE TL-EDM	DWN MRB	CKD SL	APVD WC	REV 0
DATE May 6, 2025	PROJECT NO. SWM.SWOP04071-04.004			

Figure 2









FIGURE 3
HISTORICAL GROUNDWATER ELEVATIONS
(GROUNDWATER MONITORING WELLS)





G:\SOLID_WASTE\SWOP\SWOP04071-04\GIS\Maps\004_Red_Deer_Motors\SWOP04071-04_Figure04_GW_Sept2024.mxd modified 5/6/2025 by MEGAN.BURNS

LEGEND


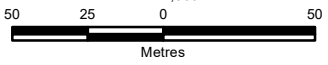
-  Monitoring Well
-  Vapour Well - Faded symbol indicates a destroyed well
-  Surface Water
-  (8XX.XX) Groundwater Elevation (masl)
-  Groundwater Elevation Contour (1 masl)
-  Inferred Groundwater Flow Direction
-  Site Boundary
-  Historic Waste Disposal (Provided by Tiamat, 2014)

NOTES
 Base data source: Imagery provided by ESRI; Red Deer County (2024)
 Roads from City of Red Deer Open Data, 2018
 VW-03 was not located
 masl - metres above sea level
 * Well excluded from groundwater contouring

STATUS
 ISSUED FOR REVIEW

2024 GROUNDWATER AND SOIL VAPOUR MONITORING REPORT RED DEER MOTORS

Groundwater Elevations September 2024

PROJECTION 3TM 114		DATUM NAD83		CLIENT 	
Scale: 1:2,500					
					
FILE NO. SWOP04071-04_Figure04_GW_Sept2024.mxd					
OFFICE Tt-EDM		DWN MRB	CKD SL	APVD WC	REV 0
DATE May 6, 2025		PROJECT NO. SWM.SWOP04071-04.004			
Figure 4					

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner

consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

APPENDIX B

SITE HISTORY, HISTORICAL INFORMATION, SITE SETTING, CONCEPTUAL SITE MODEL, AND REVIEW OF 2014 RISK MANAGEMENT PLAN

1.0 SITE HISTORY

The following section summarizes the history of the site and was developed for the 2019 groundwater and soil vapour monitoring report¹.

Municipal records indicate that waste disposal at the site occurred between approximately 1967 and 1968. This indicates that the estimated age of the waste material would be approximately 55 years old. Records indicate the waste as being municipal solid waste (MSW) consisting of plastics, cans, paper, metal, wire, glass, and rubber. Some construction debris was also identified in areas consisting of bricks, wood, and concrete. The former landfill is listed as inactive and closed.

Historical waste disposal was identified during the Phase II environmental site assessment² (ESA) throughout the entire site up to 32 Street at the north end. Estimated waste areas are identified on Figure 2. The Phase II ESA estimated the total area of buried waste at approximately 9,600 m² on-site and approximately 1,580 m² off-site (south of the 32 Street roadway).

Results of the Phase II ESA conducted by Tiamat Environmental Consultants Ltd. (Tiamat) indicated a thin surficial layer of sod, sand, and loam was overlying a sand and clay fill. The fill ranged from 3.0 m to 4.6 m deep in the areas of the site without MSW. Within the waste footprint, MSW was observed beneath the sod and loam layer to a depth of up to 4.6 m. The testholes along the east boundary of site had large amounts of MSW waste up to 3 m deep. MSW was overlying native clay. The investigation was conducted to depths of up to 7.6 m and bedrock was not encountered at any locations².

The Red Deer College historical landfill is situated west of the site, immediately west of Taylor Drive.

2.0 HISTORICAL GROUNDWATER MONITORING AND INVESTIGATION SUMMARY

The following section provides the historical environmental monitoring results for the site.

Previous reports prepared by Tiamat for the site include:

- Phase I Environmental Site Assessment, Historic Waste Disposal Site, Red Deer Motors, The City of Red Deer. September 24, 2013³.
- Phase II Environmental Site Assessment, Historic Waste Disposal Site, Red Deer Motors, The City of Red Deer. February 26, 2014².
- Environmental Risk Management Plan, Historic Waste Disposal Sites, Red Deer College & Red Deer Motors, The City of Red Deer. November 27, 2014⁴.

¹ Tetra Tech Canada Inc. 2019 Groundwater and Soil Vapour Monitoring Report – Red Deer Motors. Prepared for The City of Red Deer. October 2020. Project Number: 704-SWM.SWOP04071-01.006.

² Tiamat Environmental Consultants Ltd. 2014a. Phase II Environmental Site Assessment, Historic Waste Disposal Site, Red Deer Motors, The City of Red Deer. February 26, 2014.

³ Tiamat Environmental Consultants Ltd. 2013. Phase I Environmental Site Assessment, Historic Waste Disposal Site, Red Deer Motors, The City of Red Deer. September 24, 2013.

⁴ Tiamat Environmental Consultants Ltd. 2014b. Environmental Risk Management Plan, Historic Waste Disposal Sites, Red Deer College & Red Deer Motors, The City of Red Deer. November 27, 2014.

The Phase I ESA³ indicated that a sanitary waste permit existed for the site and environmental concerns could include the following listed below. The status of the permit is unknown and it was not reviewed.

- Generation of leachate from infiltration and percolation of precipitation into the first water-bearing zone.
- Generation of landfill gas (LFG), which may contain methane and other volatile organic compounds (VOCs) with the decomposition of the biomass materials and petroleum derived products.
- Differential ground settlement as waste material decomposes and consolidates.

Six testholes (TH-03, TH-05, TH-06, TH-07, TH-08, and TH-09) were advanced in 2013 as part of the Phase II ESA, and three vapour wells (VW-01 to VW-03) and three monitoring wells (MW-01 to MW-03) were installed. Tiamat noted that three previously installed by Alberta Environmental Protection⁵ monitoring wells were on the west boundary of the site prior to conducting the Phase II ESA. No information regarding the Alberta Environmental Protection wells was included in the Phase I ESA or Phase II ESA for the site, and borehole logs were not available for review. These wells are identified as MW-04A, MW-04B, and MW-05.

The results of the Phase II ESA² indicated the following:

- Waste material on site is located on native sand or clay till.
- In 2013, the average groundwater depth was 4.2 m, which is situated within the waste material. The estimated horizontal hydraulic gradient was 2% to the northwest. Tiamat presented an estimated horizontal groundwater flow velocity of 4.7 m/year; however, it is unclear whether these calculations were for the adjacent Red Deer College site or for the subject site.
- VOCs and other petroleum hydrocarbons (PHCs) had detectable concentrations in 2013 at the monitoring wells at the down-gradient end of the site. These parameters were indicative of leachate. The leachate was characterized showing negative redox potentials and near anoxic conditions for dissolved oxygen.
- Several commercial businesses and residential developments are nearby the Red Deer Motors site.
- Differential settlement of cap material had occurred at the site. No activities located on adjacent lands were interpreted to be contributing environmental concerns.
- Light petroleum gases were detected at vapour wells on site and PHCs were detected at the northwest portion of site.
- The vapour wells detected volatile PHCs to carbon chain 12 and semi-volatile, oxygenated, and halogenated volatile hydrocarbons and ketones were detected in the soil vapour samples.

The recommendations of the program were as follows:

- Monitor groundwater elevations and soil vapour data bi-annually for one hydrogeological cycle.
- Determine if surface water sampling should be included with groundwater sampling to determine exposure from leachate contaminants in Waskasoo Creek.
- Collect an additional set of soil vapour and groundwater analytical data, groundwater elevations, and volatile headspace measurement during the winter months to determine seasonal changes in soil vapour concentrations.

⁵ Currently Alberta Environment and Protected Areas (AEPA).

- Develop a risk management plan (RMP) to consider future land uses and address environmental concerns.
- Review all data to update the RMP with new information.

The RMP conducted by Tiamat in 2014 stated “the outcome of the RMP confirm the identified chemicals of concern and relevant risk are manageable to facilitate future developments which may lie within the regulated setback distance to the historic waste disposal site”⁴.

The following recommendations were made:

- Information in the preliminary quantitative risk assessment (PQRA) should be updated as new site information is obtained.
- A review of the RMP should be completed when the PQRA information is updated, if there are changes to the chemicals of potential concern (COPCs).
- The RMP should be reviewed and updated at five-year intervals.

2.1 2021 Vapour Well Installation

On May 4, 2021, a new vapour well (VW-04) was installed using a tracked drill rig and solid stem augers along the east site boundary near monitoring wells MW-02 and MW-03 to monitor LFG vapour along the east site boundary. While drilling the vapour well, waste was encountered 1 m below ground (mbg). The vapour well was installed with 19 mm diameter polyvinyl chloride (PVC) pipe to a depth of 4.0 mbg and screened with 19 mm slotted PVC pipe from 2.5 mbg to 4.0 mbg. Free water was not observed in the borehole during the installation of the vapour well; materials were noted as dry to a depth of 3.0 mbg and damp between 3.0 mbg and 4.0 mbg. This well was reinstalled in 2022 as described in the main report.

3.0 SITE SETTING

The following section presents an overview of the regional and local setting for the site.

3.1 Geology

The following sections summarize the regional and local geology.

3.1.1 Geological Setting and Stratigraphy

The City and the site are located within the Red Deer River drainage basin with principal drainage via the Red Deer River located northwest of the site. The river has incised the uplands with gentle slopes to the east and west of the river, south of the site, aligned with Waskasoo Creek. The geology in the river valley is characterized by fluvial surficial sediments deposited by the Red Deer River, overlying shale and sandstone bedrock of the Paskapoo Formation. Key elements of the geological setting are presented below from Tiamat’s 2013 Phase I ESA report³:

“The fertile black soil in the region (Penhold Loam) is of alluvial lacustrine origin. The Penhold Loam is a well-drained fine sandy loam classified as Chernozemic. It is generally stone free and in natural areas, is typically 1.5 m thick, more or less.

The Quaternary deposits consist of drift deposits of clay, silt, gravel and sand.

The Tertiary bedrock consists of sequences of alternating shales and sandstones of the Paskapoo Formation. This non-marine bedrock is composed of mudstone, siltstone and sandstone.”

3.1.2 Local Geology

Based on borehole logs from the Phase II ESA conducted by Tiamat, the site is underlain by sand, loam and clay fill, underlain by clay till and/or native sands. Within the waste footprint, waste was encountered immediately below surface and was mixed with sand fill material. Fill material extended to maximum depths of approximately 7.6 m below grade (mbg) and waste was identified to a maximum depth of approximately 4.3 mbg. Bedrock was not encountered during the Phase II ESA.

3.2 Hydrogeology

The following sections summarize the regional and local hydrogeology.

3.2.1 Regional Hydrogeology

The regional hydrogeology is most influenced by the presence of the river sediments situated within the valley along the Red Deer River and a buried channel trending north-northeast in the vicinity of the site. Key elements of the hydrogeological setting are presented below from Tiamat’s 2013 Phase I ESA report³:

“The dominant type of near-surface groundwater in the Paskapoo Formation in the area of assessment is sodium bicarbonate. Notable concentrations of sodium sulphate type groundwater have also been reported. The quality of groundwater for potable use is generally suitable to depths of 300 m on the west side of Red Deer and decreases to 90 m, more or less in the east.

Areas of recharge (downward flow) in unsaturated heterogeneous sediments include most areas above the river and creek valleys, whereas; the river valleys will generally exhibit discharge. The distribution of groundwater in the area can also be influenced by the local geology, topographic relief, areas of artesian flow, springs and reasonable yielding water source wells.”

There are two significant buried valleys and aquifer resources beneath the city, Mapping by the Alberta Geological Survey⁶ indicates that a north-northeast trending valley is situated east of the site, and a northeast trending valley (which connects to the first) is situated south of the site. The valleys could influence the geology and hydrogeology beneath the site, however the width of the valleys are not defined.

Waskasoo Creek is the primary surface water feature near the site. The creek historically meandered in the area of the site, but since the construction of Taylor Drive, circa late 1980s, follows a constructed drainage channel in a northerly direction. The regional groundwater flow is expected to follow the bedrock topography and may be influenced by the buried channels in the area that are trending in a northeasterly direction.”

3.2.2 Local Hydrogeology

Waskasoo Creek is located on the west side of the site and extends to the north beneath 32 Street. It flows along the east side of Taylor Drive past the site, and discharges into the Red Deer River. Waskasoo Creek is located adjacent to the west of the site, and the Red Deer River is located approximately 1.8 km north of the site. The site

⁶ Andriashek, L. comp. 2018. Thalwegs of Bedrock Valleys, Alberta (GIS data, line features); Alberta Energy Regulator, AER/AGS Digital Data 2018-0001.

is within a groundwater recharge zone and has a downward flow component. Shallow groundwater flow is assumed to flow towards the creek.

3.3 Groundwater Resource Usage

A search of the Alberta Water Well Database conducted in January 2020 for groundwater users within a 1 km radius of the Red Deer Motors site identified 13 groundwater wells; 6 of the wells are listed as domestic use, 2 are listed as domestic and stock use, 2 are listed as industrial use, 2 as “other” use, and 1 as observation use⁷.

The nearest water well to site is located approximately 650 m east of the site. The proposed well use is domestic and stock. The water wells within a 1 km radius of the site range from 5.8 m to 120 m depths. The status and use of the surrounding groundwater wells were not confirmed and they were not field verified.

4.0 REVIEW OF THE 2014 HAZARD QUOTIENTS FROM THE RISK MANAGEMENT PLAN AND MITIGATIVE MEASURES FOR THE SITE

The following section is a review of the 2014 RMP for the site that was completed by Tiamat. The review of the 2014 RMP was completed for the 2019 groundwater and soil vapour monitoring report¹.

The 2014 RMP presented a proposed site-specific environmental RMP as a tool to assist with the review of future subdivision applications on lands lying within the regulated setback distance from the site (300 m). The focus was on potential ingress of soil gas for chemicals of potential concern (COPCs) with a hazard quotient (HQ) greater than 1.0. Residential land use was considered most sensitive, and exposure ratings for other land uses (e.g. school, public institutions, commercial complexes) were considered to not be greater than residential; however, unique exceptions would have to be reviewed and addressed on a site-specific basis⁴. Further, underground utility workers and subsurface utility infrastructure were considered relevant to potential exposure.

The RMP applied a 10x factor of safety to the HQs to address uncertainties. HQs from the RMP ranged up to 588,280 (including the 10x factor of safety). Based on these, the RMP then provided recommended generic mitigative measures based on the calculated HQs, ranging from passive to active measures, recognizing that the ultimate approach would require a design professional for the proposed development.

Following the 2014 RMP, CCME released the document “A Protocol for the Derivation of Soil Vapour Quality Guidelines for Protection of Human Exposures Via Inhalation of Vapours”⁸, designed to provide guidance for developing site-appropriate soil vapour quality guidelines. The guidelines developed using the methods outlined in the CCME document were used for this current study and are included with the vapour sampling results in Table 6. HQs were calculated using estimated dose (based on concentrations measured at the site) and divided by screening criteria. Soil vapour concentrations from the Phase II ESA conducted in 2013 were not compared to soil vapour quality guidelines; however, spot checks of five target compounds with the highest HQs in the 2013 work (benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, cis-1,2-dichloroethene, and trans-1,2-dichloroethene) identified that the 2013 concentrations for soil vapour wells VW-02 and VW-03 would not have unacceptable HQs using the updated CCME methodology. Soil vapour well VW-01 would have unacceptable HQs using the updated CCME methodology for cis-1,2-dichloroethene, hexane, and vinyl chloride.

⁷ Alberta Environment and Parks. 2019b. Water Well Database. Information obtained included in Appendix C.
http://www.telusgeomatics.com/tgpub/ag_water/.

⁸ Canadian Council of Ministers of the Environment. 2014. A Protocol for the Derivation of Soil Vapour Quality Guidelines for Exposure Protection of Human Exposures via Inhalation of Vapours. Available online: <http://ceqg-rcqe.ccm.ca/en/index.html#void>.

The 2014 RMP was prepared concurrent to RMPs at several other former City landfills, and a common set of mitigative measures was applied based on the HQs. Subsequent to the 2014 RMP and to the release of the CCME Protocol document, the City of Red Deer undertook additional assessment at another former City landfill (Montfort); as part of that work, their consultant XCG Consulting Limited (XCG) revised the 2014 RMP criteria ranges for each generic mitigative measure category to include a Cancer Risk range to allow comparison of the 2014 RMP ranges with the HQ and Cancer Risks calculated by XCG⁹. From that work, XCG identified the following generic mitigative measures for developments within a 300 m setback of these landfills (based on Tiamat 2014), and these have been adopted for this site.

Passive Measures

1. Passive Measures – Level A: for Cancer Risk of $> 1E^{-5}$ and $< 5E^{-5}$ and/or HQ >0.2 and <1 .
Compacted clay liner with a minimum thickness of 1m and confirmed maximum hydraulic conductivity of 10^{-6} cm/sec.
2. Passive Measures – Level B: for Cancer Risk of $> 5E^{-5}$ and $< 5E^{-4}$ and/or HQ >1 and <5 .
Synthetic liner with type of material, thickness and installation details dependent on the design professional.
3. Passive Measures – Level C: for Cancer Risk of $> 5E^{-4}$ and $< 1E^{-3}$ and/or HQ >5 and <50 .
Passive sub-slab depressurization (SSD) system with a minimum depressurization of 4 Pa to 10 Pa. In some instances (such as a pervious subgrade), the actual depressurization necessary may require an active SSD or alternative active ventilation system.

Active Measures

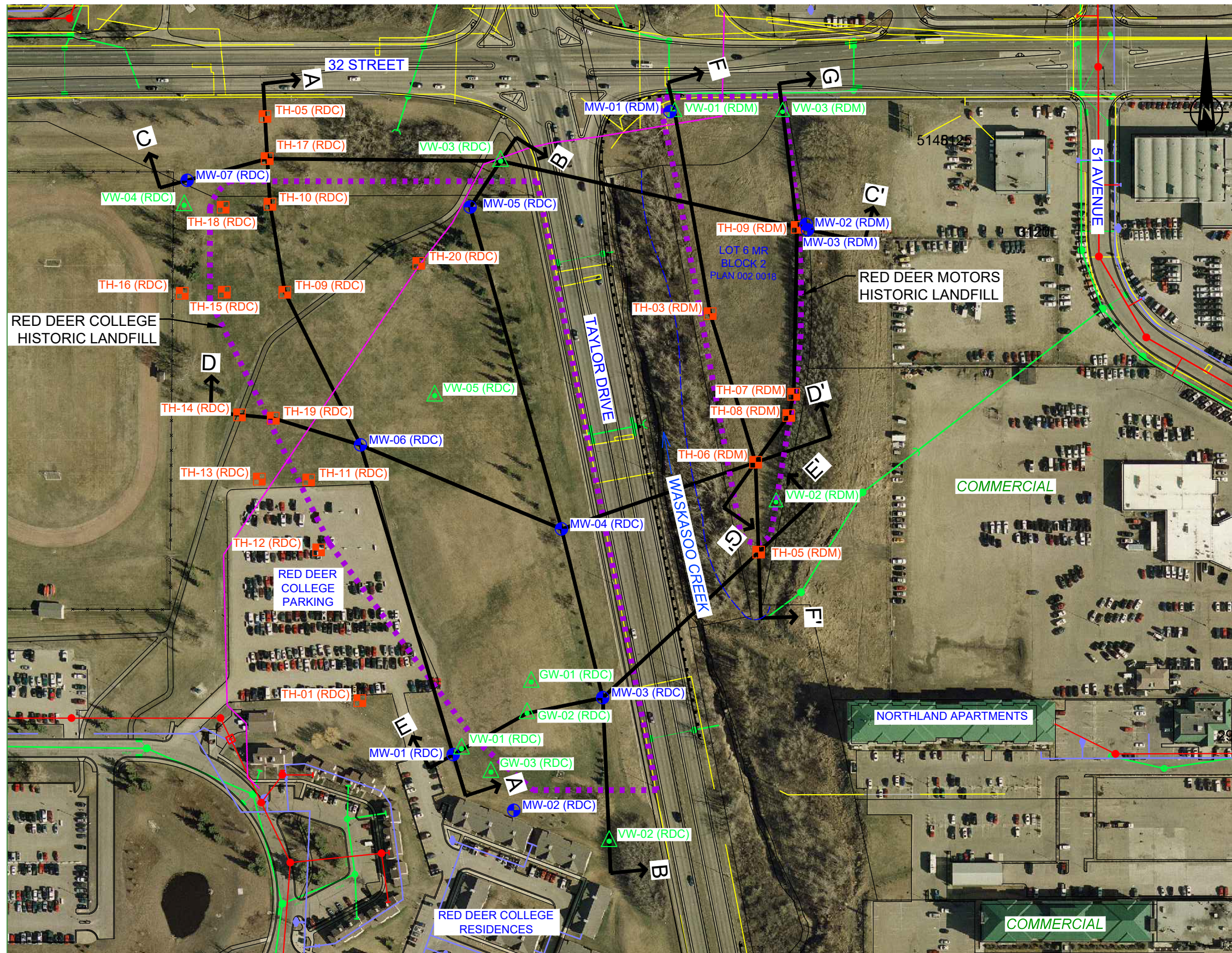
Field verify the presence of the identified chemicals of concern and other potential chemicals in the soil gas state at the development site. If confirmed, determine the most appropriate manner to prevent soil vapour intrusion.

1. Active Measures – Level D: for Cancer Risk of $> 1E^{-3}$ and $< 2E^{-3}$ and/or HQ values >50 and <100 .
Active SSD must be configured to compensate for depressurization of the building and have adequate negative pressure gradients across the entire footprint of the foundation.
2. Active Measures - Level E: for Cancer Risk of $>2E^{-3}$ and/or HQ values >100 .
Installation of geomembrane and active soil vapour extraction with system fault notification alarm.

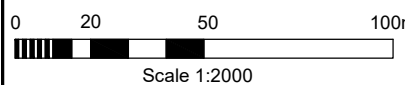
⁹ XCG Consulting Limited. 2018. Vapour Intrusion Assessment and Environmental Monitoring Report, prepared for the City of Red Deer's Montfort Landfill.

APPENDIX C

CROSS-SECTIONS (TIAMAT 2014)



SOURCE
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PERMISSION FROM THE CITY OF RED DEER.



PHASE II TEST LOCATIONS
 MW-## GROUNDWATER MONITORING WELL INSTALLED BY TIAMAT
 TH-## TESTHOLE
 VW-## SOIL VAPOUR MONITORING WELL
 MW-## GROUNDWATER MONITORING WELL INSTALLED BY OTHERS
 REFER TO TABLE 1 FOR TESTHOLE INFORMATION

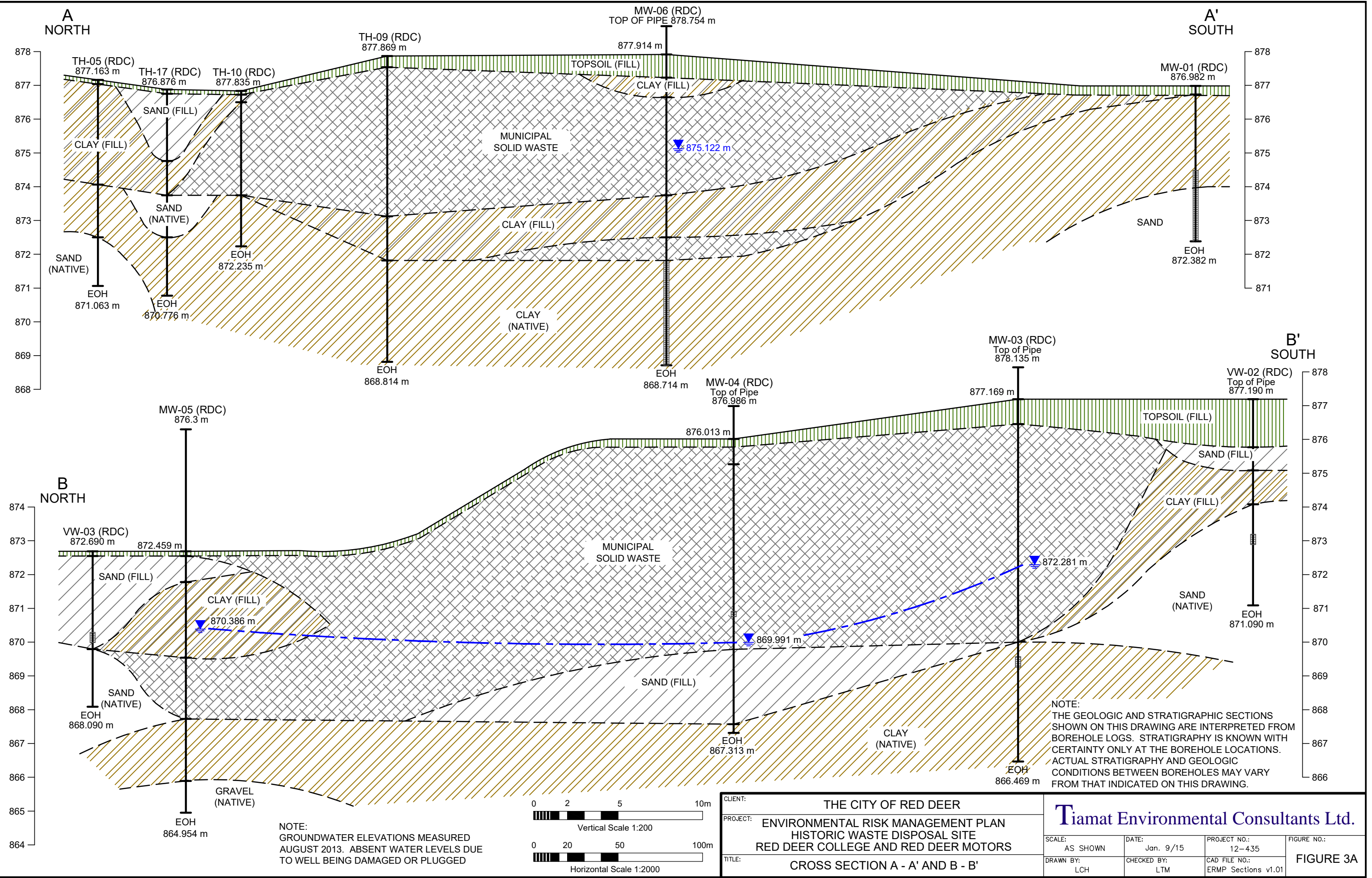
LEGEND
 HISTORIC WASTE DISPOSAL
 LOT BOUNDARY
 100 YEAR FLOOD LINE
 CROSS SECTION LOCATION

NOTE:
LOCATION OF BURIED UTILITIES ARE APPROXIMATE,
ACTUAL LOCATIONS OF THE SHALLOW UTILITIES
AND ANY OTHER UTILITIES SHOULD BE VERIFIED
PRIOR TO ANY GROUND DISTURBANCE ACTIVITY.

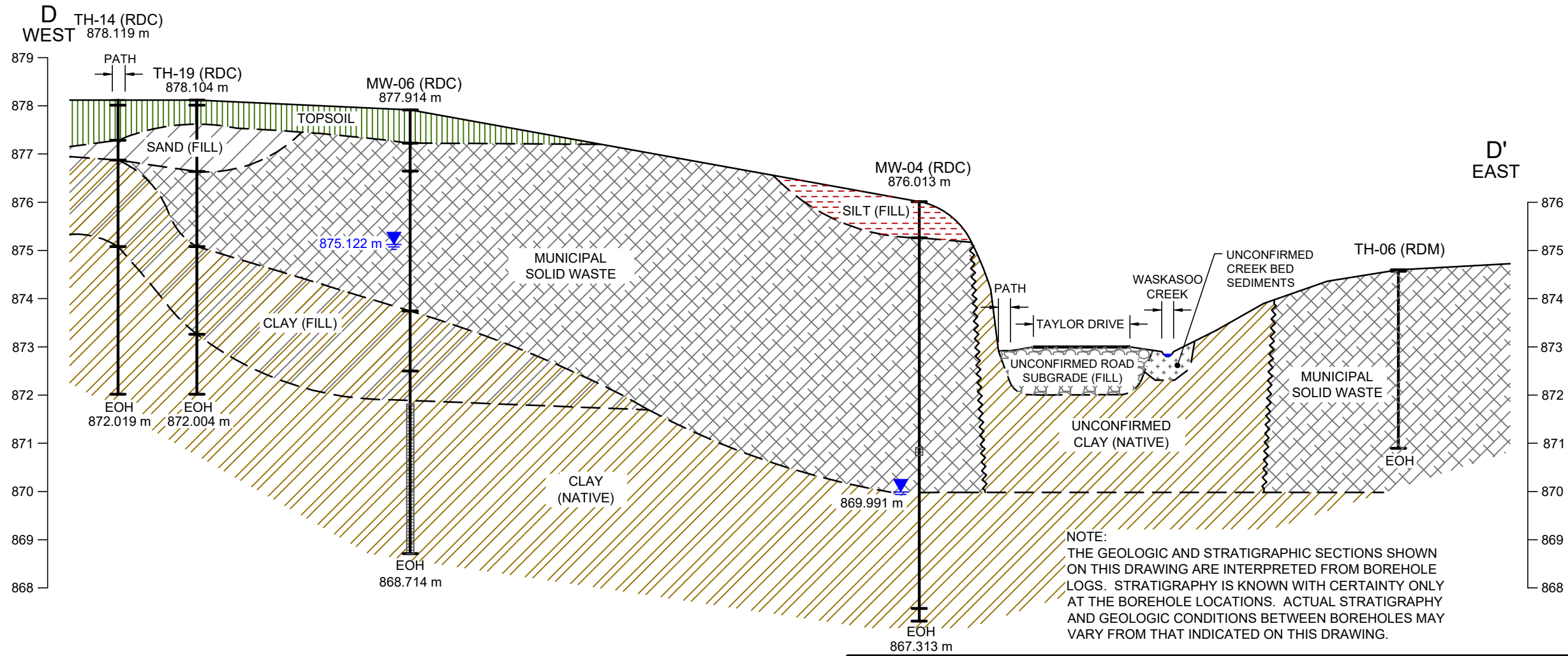
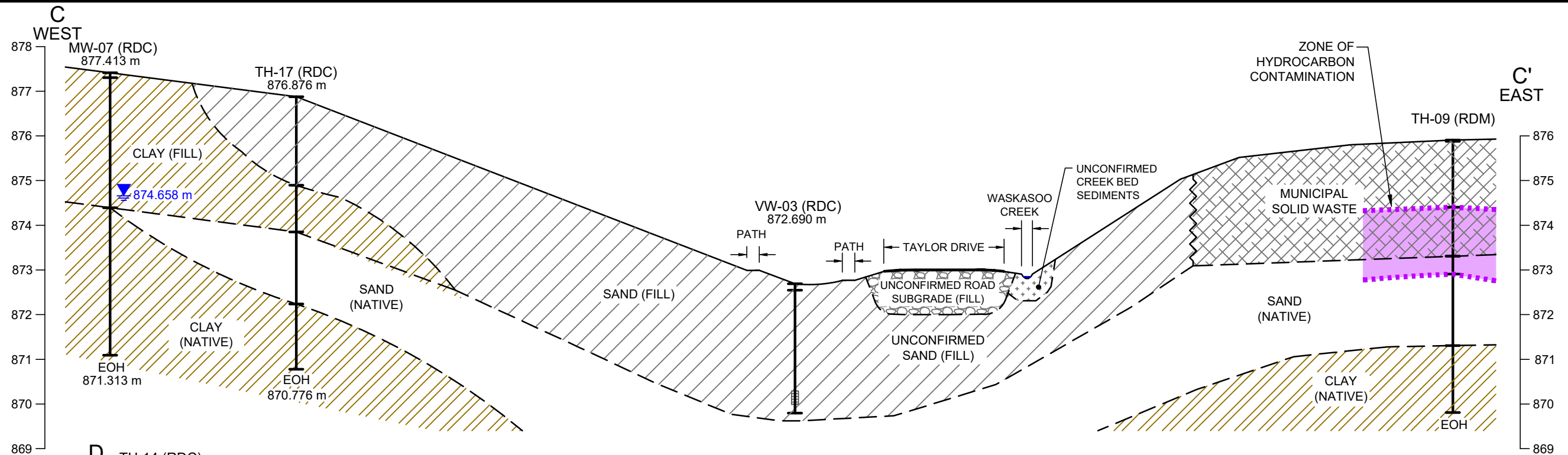
ELECTRICAL
 SANITARY
 STORM
 WATER
 PRIVATE COMMUNICATIONS
 CABLE INSTALLED JULY 2011

CLIENT:	THE CITY OF RED DEER
PROJECT:	ENVIRONMENTAL RISK MANAGEMENT PLAN HISTORIC WASTE DISPOSAL SITE RED DEER COLLEGE AND RED DEER MOTORS
TITLE:	INTERPRETED EXTENT OF WASTE

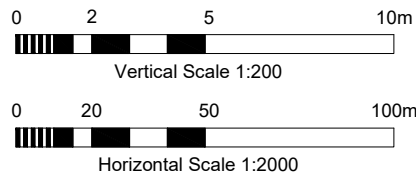
Tiamat Environmental Consultants Ltd.		SCALE:	DATE:	PROJECT NO.:	FIGURE NO.:
		1 : 2000	JAN. 18/15	12-435	FIGURE 2
DRAWN BY:	CHECKED BY:	CAD FILE NO.:			
LCH	LTM	ERP v1.03			



CLIENT:	THE CITY OF RED DEER					
PROJECT:	ENVIRONMENTAL RISK MANAGEMENT PLAN HISTORIC WASTE DISPOSAL SITE RED DEER COLLEGE AND RED DEER MOTORS					
TITLE:	CROSS SECTION A - A' AND B - B'					
SCALE:	AS SHOWN	DATE:	Jan. 9/15	PROJECT NO.:	12-435	
DRAWN BY:	LCH	CHECKED BY:	LTM	CAD FILE NO.:	ERMP Sections v1.01	
					FIGURE NO.:	FIGURE 3A

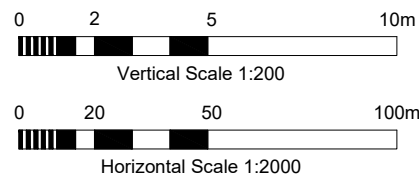
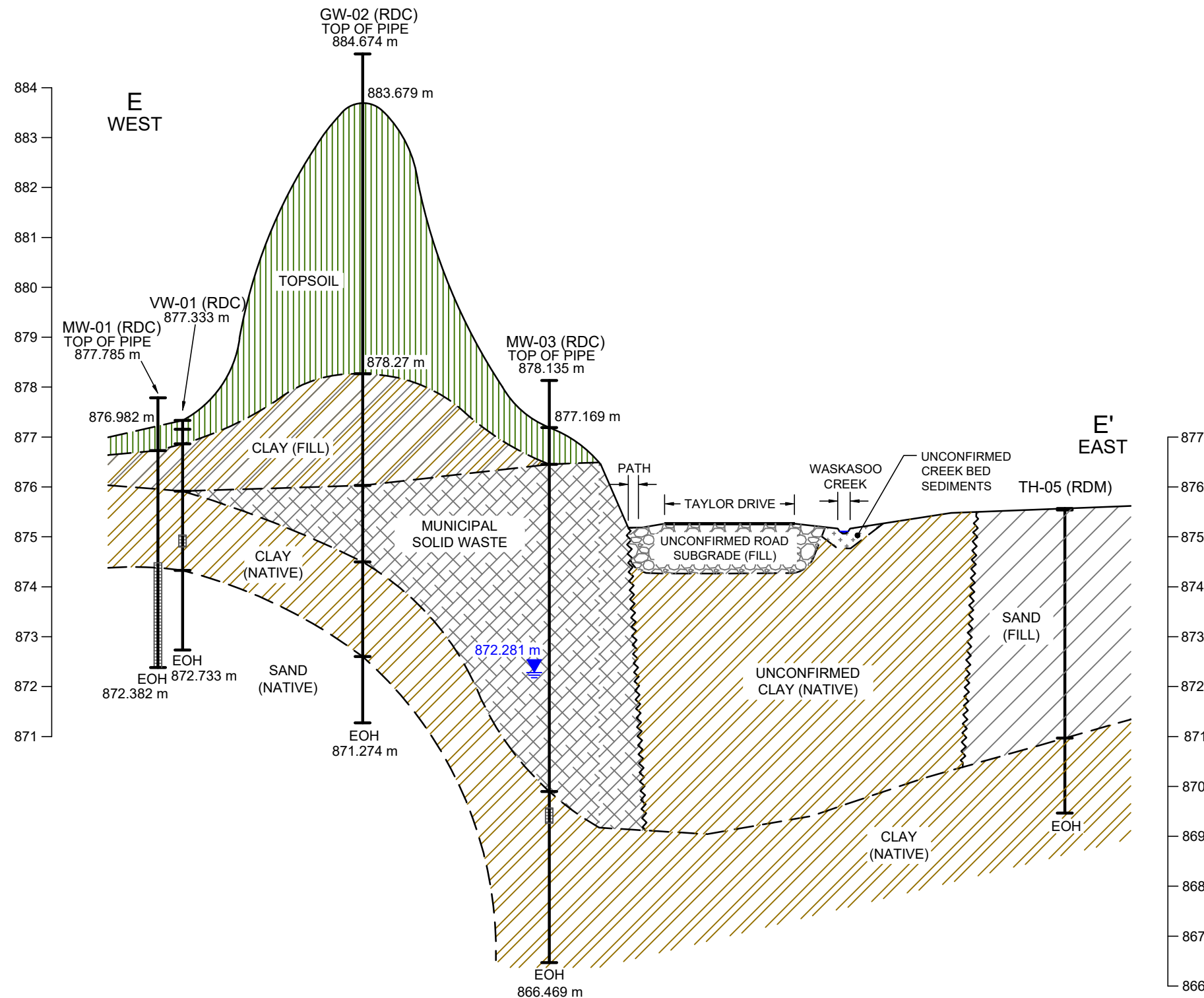


NOTE:
 THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY AND GEOLOGIC CONDITIONS BETWEEN BOREHOLES MAY VARY FROM THAT INDICATED ON THIS DRAWING.



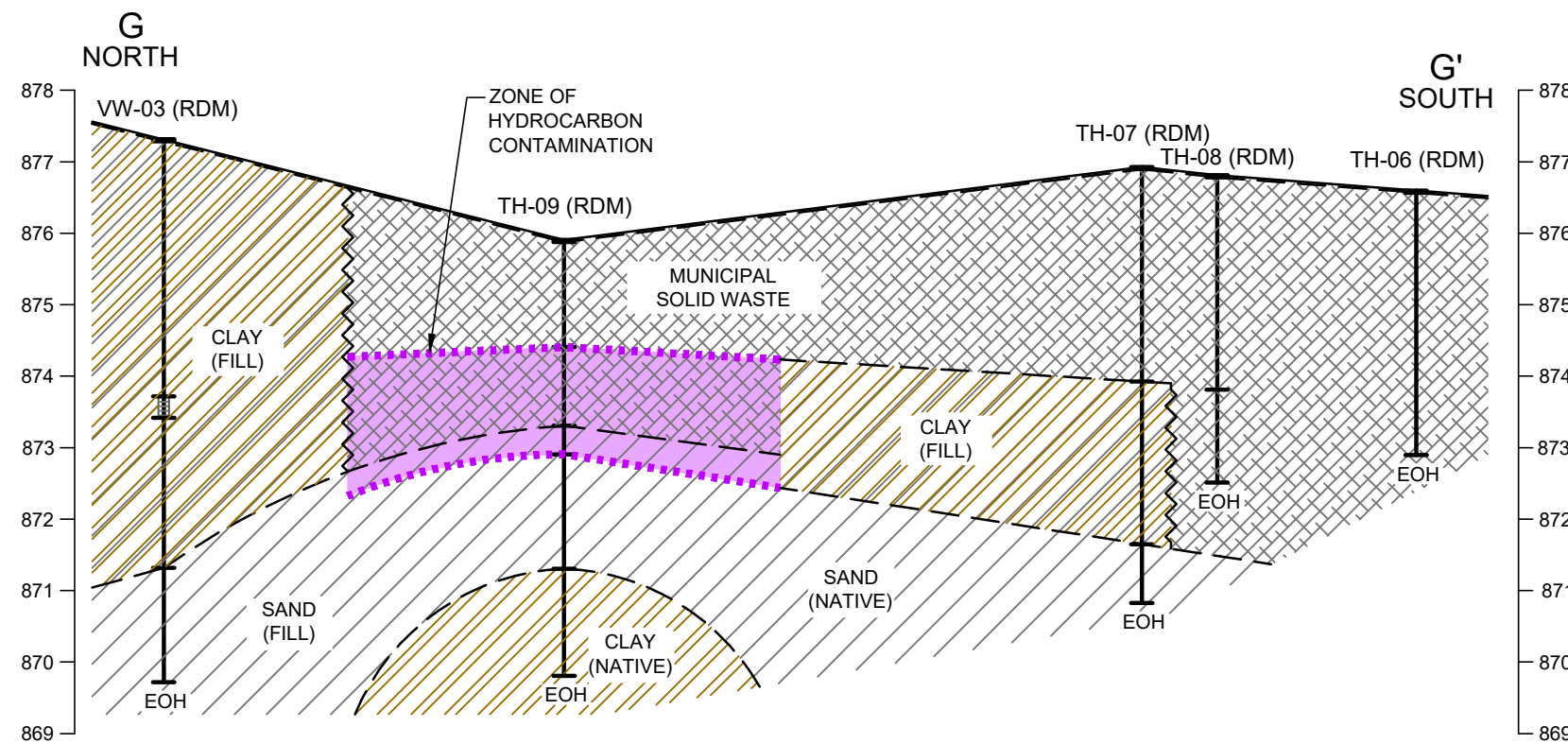
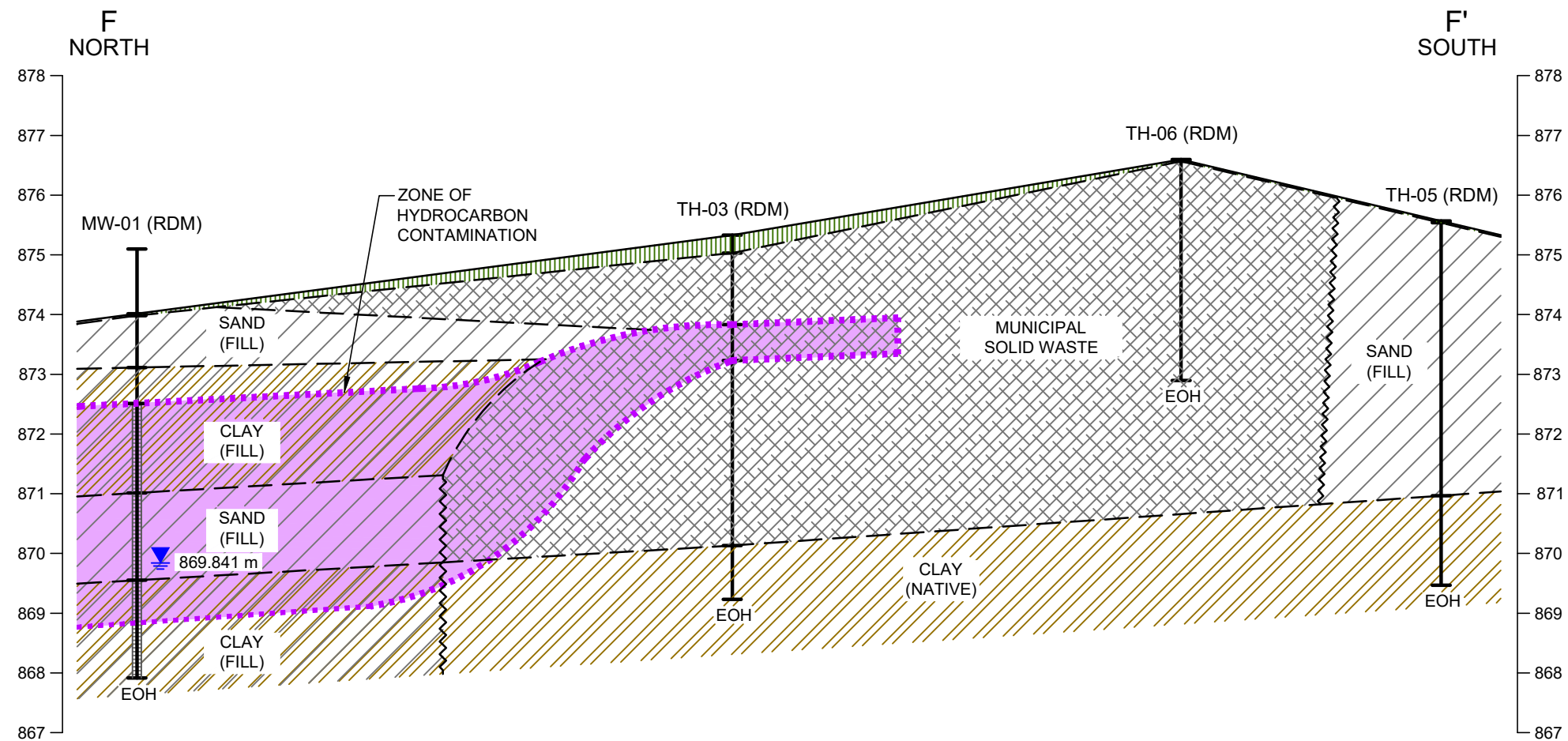
NOTE:
 GROUNDWATER ELEVATIONS MEASURED AUGUST 2013. ABSENT WATER LEVELS DUE TO WELL BEING DAMAGED OR PLUGGED

CLIENT:	THE CITY OF RED DEER			Tiamat Environmental Consultants Ltd.			
PROJECT:	ENVIRONMENTAL RISK MANAGEMENT PLAN HISTORIC WASTE DISPOSAL SITE RED DEER COLLEGE AND RED DEER MOTORS						
TITLE:	CROSS SECTION C - C' AND D - D'						
SCALE:	AS SHOWN	DATE:	June 27/14	PROJECT NO.:	12-435	FIGURE NO.:	FIGURE 3B
DRAWN BY:	LCH	CHECKED BY:	LTM	CAD FILE NO.:	ERMP Sections v1.00		

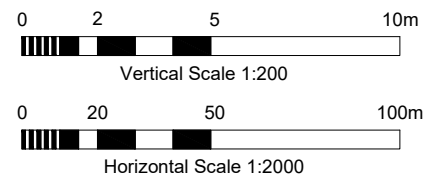


NOTE:
GROUNDWATER ELEVATIONS MEASURED
AUGUST 2013. ABSENT WATER LEVELS DUE
TO WELL BEING DAMAGED OR PLUGGED

CLIENT:	THE CITY OF RED DEER			Tiamat Environmental Consultants Ltd.
PROJECT:	ENVIRONMENTAL RISK MANAGEMENT PLAN HISTORIC WASTE DISPOSAL SITE RED DEER COLLEGE AND RED DEER MOTORS			
TITLE:	CROSS SECTION E - E'			SCALE: AS SHOWN
		DATE: June 27/14	PROJECT NO.: 12-435	FIGURE NO.:
	DRAWN BY: LCH	CHECKED BY: LTM	CAD FILE NO.: ERMP Sections v1.00	FIGURE 3C



NOTE:
 THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY AND GEOLOGIC CONDITIONS BETWEEN BOREHOLES MAY VARY FROM THAT INDICATED ON THIS DRAWING.



NOTE:
 GROUNDWATER ELEVATIONS MEASURED AUGUST 2013. ABSENT WATER LEVELS DUE TO WELL BEING DAMAGED OR PLUGGED

CLIENT:	THE CITY OF RED DEER			Tiamat Environmental Consultants Ltd.
PROJECT:	ENVIRONMENTAL RISK MANAGEMENT PLAN HISTORIC WASTE DISPOSAL SITE RED DEER COLLEGE AND RED DEER MOTORS			
TITLE:	CROSS SECTION F - F' AND G - G'			SCALE: AS SHOWN
		DATE: June 27/14	PROJECT NO.: 12-435	FIGURE NO.:
	DRAWN BY: LCH	CHECKED BY: LTM	CAD FILE NO.: ERMP Sections v1.00	FIGURE 3D

APPENDIX D

LABORATORY ANALYTICAL REPORTS



CERTIFICATE OF ANALYSIS

Work Order	: CG2417906		
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Darby Madalena	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary Alberta Canada T2C 3G3	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: 403 203 3355	Telephone	: +1 519 886 6910
Project	: SWM.SWOP04071-04.004	Date Samples Received	: 04-Dec-2024 06:55
PO	: SWM.SWOP04071-04.004	Date Analysis Commenced	: 11-Dec-2024
C-O-C number	: CORD RDM VWs	Issue Date	: 18-Dec-2024 16:42
Sampler	: ----		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
David Tremblett	VOC Section Supervisor	Air Quality, Waterloo, Ontario



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	no units
%	percent
inches Hg	inches of mercury
ppbv	parts per billion (volume/volume)
µg/m ³	micrograms per cubic metre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

RRR - Result may be biased high due to possible contamination.



Qualifiers

<u>Qualifier</u>	<u>Description</u>
AI	Analytical interferences may be present. Result may be biased high.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLQ	Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.
RRR	Refer to report comments for issues regarding this analysis.



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	
					Result	Result	----	----	----	
Field Tests										
ID, batch proof	----	EF001/WT	-	-	241025.115	241111.126	----	----	----	
ID, canister	----	EF001/WT	-	-	01400-0370	01400-0578	----	----	----	
ID, regulator	----	EF001/WT	-	-	G304	G304	----	----	----	
Pressure on receipt	----	EF001/WT	0.10	inches Hg	-8.99	-11.6	----	----	----	
Permanent Gases										
Carbon dioxide	124-38-9	E629B-H/WT	0.050	%	4.94	5.81	----	----	----	
Carbon monoxide	630-08-0	E629B-H/WT	0.050	%	<0.050	<0.050	----	----	----	
Methane	74-82-8	E629B-H/WT	0.050	%	1.45	1.78	----	----	----	
Nitrogen	7727-37-9	E629B-H/WT	1.0	%	73.1	69.7	----	----	----	
Oxygen	7782-44-7	E629B-H/WT	0.10	%	14.9	13.4	----	----	----	
Volatile Organic Compounds										
Acetone	67-64-1	EC621B/WT	2.4	µg/m³	18.8	21.1	----	----	----	
Acetone	67-64-1	E621B/WT	1.0	ppbv	7.9	8.9	----	----	----	
Allyl chloride	107-05-1	EC621B/WT	0.63	µg/m³	<0.63	<0.72	----	----	----	
Allyl chloride	107-05-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Benzene	71-43-2	EC621B/WT	0.32	µg/m³	18.8	96.8	----	----	----	
Benzene	71-43-2	E621B/WT	0.10	ppbv	5.90	30.3 ^{RRR}	----	----	----	
Benzyl chloride	100-44-7	EC621B/WT	1.0	µg/m³	<1.0	<1.2	----	----	----	
Benzyl chloride	100-44-7	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Bromodichloromethane	75-27-4	EC621B/WT	1.3	µg/m³	3.8	4.0	----	----	----	
Bromodichloromethane	75-27-4	E621B/WT	0.20	ppbv	0.56	0.59	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	----
					Result	Result	----	----	----	----
Volatile Organic Compounds										
Bromoform	75-25-2	EC621B/WT	2.1	µg/m³	<2.1	<2.4	----	----	----	----
Bromoform	75-25-2	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	----
Bromomethane	74-83-9	EC621B/WT	0.78	µg/m³	<0.78	<0.89	----	----	----	----
Bromomethane	74-83-9	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	----
Butadiene, 1,3-	106-99-0	EC621B/WT	0.44	µg/m³	<4.64	<5.75	----	----	----	----
Butadiene, 1,3-	106-99-0	E621B/WT	0.20	ppbv	<2.10	<2.60	----	----	----	----
Carbon disulfide	75-15-0	EC621B/WT	1.6	µg/m³	<1.6	<1.8	----	----	----	----
Carbon disulfide	75-15-0	E621B/WT	0.50	ppbv	<0.51	<0.57	----	----	----	----
Carbon tetrachloride	56-23-5	EC621B/WT	1.30	µg/m³	<1.26	<1.45	----	----	----	----
Carbon tetrachloride	56-23-5	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	----
Chlorobenzene	108-90-7	EC621B/WT	0.92	µg/m³	<0.92	<1.06	----	----	----	----
Chlorobenzene	108-90-7	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	----
Chloroethane	75-00-3	EC621B/WT	0.53	µg/m³	0.55	<0.61	----	----	----	----
Chloroethane	75-00-3	E621B/WT	0.20	ppbv	0.21	<0.23	----	----	----	----
Chloroform	67-66-3	EC621B/WT	0.98	µg/m³	<0.98	<1.12	----	----	----	----
Chloroform	67-66-3	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	----
Chloromethane	74-87-3	EC621B/WT	0.41	µg/m³	1.92	1.98	----	----	----	----
Chloromethane	74-87-3	E621B/WT	0.20	ppbv	0.93	0.96	----	----	----	----
Cyclohexane	110-82-7	EC621B/WT	0.69	µg/m³	1680	1750	----	----	----	----
Cyclohexane	110-82-7	E621B/WT	0.20	ppbv	487	509	----	----	----	----
Dibromochloromethane	124-48-1	EC621B/WT	1.7	µg/m³	<1.7	<2.0	----	----	----	----



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Dibromochloromethane	124-48-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dibromoethane, 1,2-	106-93-4	EC621B/WT	1.5	µg/m³	<1.5	<1.8	----	----	----	
Dibromoethane, 1,2-	106-93-4	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichlorobenzene, 1,2-	95-50-1	EC621B/WT	1.2	µg/m³	<1.2	<1.4	----	----	----	
Dichlorobenzene, 1,2-	95-50-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichlorobenzene, 1,3-	541-73-1	EC621B/WT	1.2	µg/m³	<1.2	<1.4	----	----	----	
Dichlorobenzene, 1,3-	541-73-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichlorobenzene, 1,4-	106-46-7	EC621B/WT	1.2	µg/m³	<1.2	<1.4	----	----	----	
Dichlorobenzene, 1,4-	106-46-7	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichlorodifluoromethane	75-71-8	EC621B/WT	1.0	µg/m³	4.4	4.4	----	----	----	
Dichlorodifluoromethane	75-71-8	E621B/WT	0.20	ppbv	0.88	0.89	----	----	----	
Dichloroethane, 1,1-	75-34-3	EC621B/WT	0.81	µg/m³	<0.81	<0.93	----	----	----	
Dichloroethane, 1,1-	75-34-3	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichloroethane, 1,2-	107-06-2	EC621B/WT	0.81	µg/m³	10.0	11.4	----	----	----	
Dichloroethane, 1,2-	107-06-2	E621B/WT	0.20	ppbv	2.47 ^{AI}	2.81 ^{AI}	----	----	----	
Dichloroethylene, 1,1-	75-35-4	EC621B/WT	0.79	µg/m³	<0.79	<0.91	----	----	----	
Dichloroethylene, 1,1-	75-35-4	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichloroethylene, cis-1,2-	156-59-2	EC621B/WT	0.79	µg/m³	7.73	9.32	----	----	----	
Dichloroethylene, cis-1,2-	156-59-2	E621B/WT	0.20	ppbv	1.95	2.35	----	----	----	
Dichloroethylene, trans-1,2-	156-60-5	EC621B/WT	0.79	µg/m³	2.50	2.78	----	----	----	
Dichloroethylene, trans-1,2-	156-60-5	E621B/WT	0.20	ppbv	0.63	0.70	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Dichloromethane	75-09-2	EC621B/WT	0.69	µg/m³	<0.69	<0.80	----	----	----	
Dichloromethane	75-09-2	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichloropropane, 1,2-	78-87-5	EC621B/WT	0.9	µg/m³	<0.9	<1.1	----	----	----	
Dichloropropane, 1,2-	78-87-5	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichloropropylene, cis-1,3-	10061-01-5	EC621B/WT	0.9	µg/m³	<0.9	<1.0	----	----	----	
Dichloropropylene, cis-1,3-	10061-01-5	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichloropropylene, cis+trans-1,3-	542-75-6	EC621B/WT	1.3	µg/m³	<1.8	<2.1	----	----	----	
Dichloropropylene, cis+trans-1,3-	542-75-6	E621B/WT	0.30	ppbv	<0.30	<0.32	----	----	----	
Dichloropropylene, trans-1,3-	10061-02-6	EC621B/WT	0.9	µg/m³	<0.9	<1.0	----	----	----	
Dichloropropylene, trans-1,3-	10061-02-6	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	EC621B/WT	1.4	µg/m³	1.9	2.0	----	----	----	
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B/WT	0.20	ppbv	0.27	0.29	----	----	----	
Dioxane, 1,4-	123-91-1	EC621B/WT	0.72	µg/m³	<0.72	<0.83	----	----	----	
Dioxane, 1,4-	123-91-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Ethyl acetate	141-78-6	EC621B/WT	0.72	µg/m³	<1.51	<2.16	----	----	----	
Ethyl acetate	141-78-6	E621B/WT	0.20	ppbv	<0.42 ^{DLO}	<0.60 ^{DLO}	----	----	----	
Ethylbenzene	100-41-4	EC621B/WT	0.43	µg/m³	2.47	4.69	----	----	----	
Ethylbenzene	100-41-4	E621B/WT	0.10	ppbv	0.57	1.08	----	----	----	
Ethyltoluene, 4-	622-96-8	EC621B/WT	1.0	µg/m³	2.9	3.1	----	----	----	
Ethyltoluene, 4-	622-96-8	E621B/WT	0.20	ppbv	0.60	0.64	----	----	----	
Heptane, n-	142-82-5	EC621B/WT	0.82	µg/m³	898	939	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Heptane, n-	142-82-5	E621B/WT	0.20	ppbv	219	229	----	----	----	
Hexachlorobutadiene	87-68-3	EC621B/WT	2.1	µg/m³	<2.1	<2.4	----	----	----	
Hexachlorobutadiene	87-68-3	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Hexane, n-	110-54-3	EC621B/WT	0.70	µg/m³	3770	3980	----	----	----	
Hexane, n-	110-54-3	E621B/WT	0.20	ppbv	1070	1130	----	----	----	
Hexanone, 2-	591-78-6	EC621B/WT	4.10	µg/m³	<148	<186	----	----	----	
Hexanone, 2-	591-78-6	E621B/WT	1.0	ppbv	<36.2 ^{DLO}	<45.5 ^{DLO}	----	----	----	
Isopropylbenzene	98-82-8	EC621B/WT	1.0	µg/m³	2.1	2.3	----	----	----	
Isopropylbenzene	98-82-8	E621B/WT	0.20	ppbv	0.42	0.47	----	----	----	
Methyl ethyl ketone [MEK]	78-93-3	EC621B/WT	0.59	µg/m³	<7.37	<10.3	----	----	----	
Methyl ethyl ketone [MEK]	78-93-3	E621B/WT	0.20	ppbv	<2.50 ^{DLO}	<3.50 ^{DLO}	----	----	----	
Methyl isobutyl ketone [MIBK]	108-10-1	EC621B/WT	0.82	µg/m³	<0.82	<0.94	----	----	----	
Methyl isobutyl ketone [MIBK]	108-10-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	EC621B/WT	0.72	µg/m³	<0.72	<0.83	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Naphthalene	91-20-3	EC621B/WT	0.52	µg/m³	4.14	4.46	----	----	----	
Naphthalene	91-20-3	E621B/WT	0.10	ppbv	0.79 ^{AI}	0.85 ^{AI}	----	----	----	
Propylene	115-07-1	EC621B/WT	0.34	µg/m³	57.3	63.5	----	----	----	
Propylene	115-07-1	E621B/WT	0.20	ppbv	33.3 ^{AI}	36.9 ^{AI}	----	----	----	
Styrene	100-42-5	EC621B/WT	0.85	µg/m³	<0.85	1.70	----	----	----	
Styrene	100-42-5	E621B/WT	0.20	ppbv	<0.20	0.40	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Tetrachloroethane, 1,1,2,2-	79-34-5	EC621B/WT	1.4	µg/m³	<1.6	<1.8	----	----	----	
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B/WT	0.20	ppbv	<0.24 ^{DLO}	<0.26 ^{DLO}	----	----	----	
Tetrachloroethylene	127-18-4	EC621B/WT	1.4	µg/m³	<1.4	<1.6	----	----	----	
Tetrachloroethylene	127-18-4	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Tetrahydrofuran	109-99-9	EC621B/WT	0.59	µg/m³	1.18	0.91	----	----	----	
Tetrahydrofuran	109-99-9	E621B/WT	0.20	ppbv	0.40	0.31	----	----	----	
Toluene	108-88-3	EC621B/WT	0.38	µg/m³	13.4	66.3	----	----	----	
Toluene	108-88-3	E621B/WT	0.10	ppbv	3.56	17.6 ^{RRR}	----	----	----	
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	EC621B/WT	1.5	µg/m³	<1.5	<1.8	----	----	----	
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Trichlorobenzene, 1,2,4-	120-82-1	EC621B/WT	1.5	µg/m³	<1.5	<1.7	----	----	----	
Trichlorobenzene, 1,2,4-	120-82-1	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Trichloroethane, 1,1,1-	71-55-6	EC621B/WT	1.1	µg/m³	<1.1	<1.2	----	----	----	
Trichloroethane, 1,1,1-	71-55-6	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Trichloroethane, 1,1,2-	79-00-5	EC621B/WT	1.1	µg/m³	<1.1	<1.2	----	----	----	
Trichloroethane, 1,1,2-	79-00-5	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Trichloroethylene	79-01-6	EC621B/WT	1.1	µg/m³	1.4	1.8	----	----	----	
Trichloroethylene	79-01-6	E621B/WT	0.20	ppbv	0.26	0.33	----	----	----	
Trichlorofluoromethane	75-69-4	EC621B/WT	1.1	µg/m³	<1.1	<1.3	----	----	----	
Trichlorofluoromethane	75-69-4	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Trimethylbenzene, 1,2,4-	95-63-6	EC621B/WT	1.0	µg/m³	4.0	4.0	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Trimethylbenzene, 1,2,4-	95-63-6	E621B/WT	0.20	ppbv	0.82	0.82	----	----	----	
Trimethylbenzene, 1,3,5-	108-67-8	EC621B/WT	1.0	µg/m³	135	146	----	----	----	
Trimethylbenzene, 1,3,5-	108-67-8	E621B/WT	0.20	ppbv	27.4	29.7	----	----	----	
Trimethylpentane, 2,2,4-	540-84-1	EC621B/WT	0.9	µg/m³	132	155	----	----	----	
Trimethylpentane, 2,2,4-	540-84-1	E621B/WT	0.20	ppbv	28.3	33.1	----	----	----	
Vinyl acetate	108-05-4	EC621B/WT	1.8	µg/m³	<422	<394	----	----	----	
Vinyl acetate	108-05-4	E621B/WT	0.50	ppbv	<120 ^{DLQ}	<112 ^{DLQ}	----	----	----	
Vinyl bromide	593-60-2	EC621B/WT	0.9	µg/m³	<0.9	<1.0	----	----	----	
Vinyl bromide	593-60-2	E621B/WT	0.20	ppbv	<0.20	<0.23	----	----	----	
Vinyl chloride	75-01-4	EC621B/WT	0.51	µg/m³	242	256	----	----	----	
Vinyl chloride	75-01-4	E621B/WT	0.20	ppbv	94.7	100	----	----	----	
Xylene, m+p-	179601-23-1	EC621B/WT	0.87	µg/m³	6.90	11.3	----	----	----	
Xylene, m+p-	179601-23-1	E621B/WT	0.20	ppbv	1.59	2.61	----	----	----	
Xylene, o-	95-47-6	EC621B/WT	0.43	µg/m³	5.17	6.60	----	----	----	
Xylene, o-	95-47-6	E621B/WT	0.10	ppbv	1.19	1.52	----	----	----	
Xylenes, total	1330-20-7	EC621B/WT	1.3	µg/m³	12.1	17.9	----	----	----	
Xylenes, total	1330-20-7	E621B/WT	0.30	ppbv	2.78	4.13	----	----	----	
BTEX, total	----	EC621B/WT	1.2	µg/m³	46.8	186	----	----	----	
BTEX, total	----	E621B/WT	0.30	ppbv	12.8	53.1	----	----	----	
Hydrocarbons										
Aliphatic (C10-C12)	----	E593C/WT	15	µg/m³	10500 ^{DLHC}	10700 ^{DLHC}	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	24VW-01	DUPLICATE	----	----	----
					Client sampling date / time	03-Dec-2024 00:00	03-Dec-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2417906-001	CG2417906-002	----	----	----	----
					Result	Result	----	----	----	----
Hydrocarbons										
Aliphatic (C12-C16)	----	E593C/WT	30	µg/m ³	<710 DLHC	<659 DLHC	----	----	----	----
Aliphatic (C6-C8)	----	E593C/WT	15	µg/m ³	24600 DLHC	25800 DLHC	----	----	----	----
Aliphatic (C8-C10)	----	E593C/WT	15	µg/m ³	13700 DLHC	14300 DLHC	----	----	----	----
Aromatic (C10-C12)	----	E593C/WT	15	µg/m ³	1030 DLHC	1080 DLHC	----	----	----	----
Aromatic (C12-C16)	----	E593C/WT	30	µg/m ³	<1440 DLHC	<1340 DLHC	----	----	----	----
Aromatic (C6-C8)	----	E593C/WT	15	µg/m ³	<721 DLHC	<670 DLHC	----	----	----	----
Aromatic (C8-C10)	----	E593C/WT	15	µg/m ³	<721 DLHC	<670 DLHC	----	----	----	----
F1 (C6-C10)	----	E593A/WT	15	µg/m ³	35600 DLHC	37200 DLHC	----	----	----	----
F1-BTEX	----	EC592A/WT	15	µg/m ³	35600	37000	----	----	----	----
F2 (C10-C16)	----	E593A/WT	15	µg/m ³	14900 DLHC	15500 DLHC	----	----	----	----
F2-Naphthalene	----	EC593D/WT	15	µg/m ³	14900	15500	----	----	----	----
TVOC (C10-C12)	----	E593C/WT	15	µg/m ³	11500 DLHC	11800 DLHC	----	----	----	----
TVOC (C12-C16)	----	E593C/WT	30	µg/m ³	<1440 DLHC	<1340 DLHC	----	----	----	----
TVOC (C6-C8)	----	E593C/WT	15	µg/m ³	24600 DLHC	25800 DLHC	----	----	----	----
TVOC (C8-C10)	----	E593C/WT	15	µg/m ³	13700 DLHC	14300 DLHC	----	----	----	----
Hydrocarbons Surrogates										
Bromofluorobenzene, 4-	460-00-4	E593C/WT	1	%	98.0	96.6	----	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E621B/WT	0.20	%	94.5	89.4	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : CG2417906</p> <p>Client : Tetra Tech Canada Inc.</p> <p>Contact : Darby Madalena</p> <p>Address : 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3</p> <p>Telephone : 403 203 3355</p> <p>Project : SWM.SWOP04071-04.004</p> <p>PO : SWM.SWOP04071-04.004</p> <p>C-O-C number : CORD RDM VWs</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>	<p>Page : 1 of 7</p> <p>Laboratory : ALS Environmental - Calgary</p> <p>Account Manager : Patryk Wojciak</p> <p>Address : 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5</p> <p>Telephone : +1 403 407 1800</p> <p>Date Samples Received : 04-Dec-2024 06:55</p> <p>Issue Date : 18-Dec-2024 16:42</p>
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This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
- DQO: Data Quality Objective.
- LOR: Limit of Reporting (detection limit).
- RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: Air

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Volatile Organic Compounds	QC-1808681-002	----	Benzyl chloride	100-44-7	E621B	61.8 % LCS-ND	70.0-130%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Air

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Field Tests : Air Canister Information										
Canister 24VW-01	EF001	03-Dec-2024	----	----	----		11-Dec-2024	----	8 days	
Field Tests : Air Canister Information										
Canister DUPLICATE	EF001	03-Dec-2024	----	----	----		11-Dec-2024	----	8 days	
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Canister 24VW-01	E593C	03-Dec-2024	----	----	----		13-Dec-2024	30 days	10 days	✔
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Canister DUPLICATE	E593C	03-Dec-2024	----	----	----		13-Dec-2024	30 days	10 days	✔
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (ug/m3)										
Canister 24VW-01	E593A	03-Dec-2024	----	----	----		13-Dec-2024	30 days	10 days	✔
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (ug/m3)										
Canister DUPLICATE	E593A	03-Dec-2024	----	----	----		13-Dec-2024	30 days	10 days	✔
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Canister 24VW-01	E629B-H	03-Dec-2024	----	----	----		11-Dec-2024	30 days	8 days	✔



Matrix: **Air** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Canister DUPLICATE	E629B-H	03-Dec-2024	----	----	----		11-Dec-2024	30 days	8 days	✔
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Canister 24VW-01	E621B	03-Dec-2024	----	----	----		13-Dec-2024	30 days	10 days	✔
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Canister DUPLICATE	E621B	03-Dec-2024	----	----	----		13-Dec-2024	30 days	10 days	✔

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Air

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Permanent Gases (Methane, CO ₂ , CO, N ₂ , and O ₂) in Air (Routine Level, %)	E629B-H	1804339	1	17	5.8	5.0	✔
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	1808683	1	2	50.0	5.0	✔
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	1808682	1	2	50.0	5.0	✔
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	1808681	1	2	50.0	5.0	✔
Laboratory Control Samples (LCS)							
Permanent Gases (Methane, CO ₂ , CO, N ₂ , and O ₂) in Air (Routine Level, %)	E629B-H	1804339	1	17	5.8	5.0	✔
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	1808683	1	2	50.0	5.0	✔
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	1808682	1	2	50.0	5.0	✔
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	1808681	1	2	50.0	5.0	✔
Method Blanks (MB)							
Air Canister Information	EF001	1804574	1	10	10.0	5.0	✔
Permanent Gases (Methane, CO ₂ , CO, N ₂ , and O ₂) in Air (Routine Level, %)	E629B-H	1804339	1	17	5.8	5.0	✔
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	1808683	1	2	50.0	5.0	✔
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	1808682	1	2	50.0	5.0	✔
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	1808681	1	2	50.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Total Volatile Organic Compounds (TVOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Total Volatile Organic Compounds (TVOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Volatile Organic Compounds (VOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H ALS Environmental - Waterloo	Air	EPA Method 3C & ASTM D1946	This analysis is performed using procedures adapted from EPA Method 3C & ASTM D1946. Air samples are collected into cleaned evacuated canisters. A volume of air is removed from the canister and injected by means of a gas-sampling/backflush valve onto a series of packed GC columns and measured using a thermal conductivity detector (TCD). Oxygen is not separated from Argon. Canister samples will be retained for 7 calendar days after final report. If you require a longer canister storage time, please contact your account manager.
F1-BTEX in Canisters or Bags GC-MS (µg/m3)	EC592A ALS Environmental - Waterloo	Air	unit conversion	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
F2-Naphthalene in Canisters by GC-MS (ug/m3)	EC593D ALS Environmental - Waterloo	Air	CCME PHC	F2-PAH = CCME Fraction 2 (C10-C16) minus Naphthalene
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ug/m3)	EC621B ALS Environmental - Waterloo	Air	unit conversion	Convert ppbV to ug/m3
Air Canister Information	EF001 ALS Environmental - Waterloo	Air	In-house	Air canister information provided by client and recorded on ALS report may affect the validity of results.



QUALITY CONTROL REPORT

Work Order	: CG2417906	Page	: 1 of 11
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Calgary
Contact	: Darby Madalena	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: 403 203 3355	Telephone	: +1 403 407 1800
Project	: SWM.SWOP04071-04.004	Date Samples Received	: 04-Dec-2024 06:55
PO	: SWM.SWOP04071-04.004	Date Analysis Commenced	: 11-Dec-2024
C-O-C number	: CORD RDM VWs	Issue Date	: 18-Dec-2024 16:42
Sampler	: ----		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
David Tremblett	VOC Section Supervisor	Waterloo Air Quality, Waterloo, Ontario

Page : 2 of 11
Work Order : CG2417906
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.004



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Air

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Permanent Gases (QC Lot: 1804339)											
WT2435902-001	Anonymous	Carbon dioxide	124-38-9	E629B-H	0.050	%	0.478	0.480	0.002	Diff <2x LOR	----
		Carbon monoxide	630-08-0	E629B-H	0.050	%	<0.050	<0.050	0	Diff <2x LOR	----
		Methane	74-82-8	E629B-H	0.050	%	<0.050	<0.050	0	Diff <2x LOR	----
		Nitrogen	7727-37-9	E629B-H	1.3	%	155	151	3.08%	20%	----
		Oxygen	7782-44-7	E629B-H	0.20	%	19.4	19.2	1.13%	20%	----
Volatile Organic Compounds (QC Lot: 1808681)											
CG2417906-001	24VW-01	Acetone	67-64-1	E621B	5.0	ppbv	7.9	7.7	0.2	Diff <2x LOR	----
		Allyl chloride	107-05-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Benzene	71-43-2	E621B	0.50	ppbv	5.90	5.87	0.593%	30%	----
		Benzyl chloride	100-44-7	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E621B	0.20	ppbv	0.56	0.54	0.02	Diff <2x LOR	----
		Bromoform	75-25-2	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Butadiene, 1,3-	106-99-0	E621B	2.10	ppbv	<2.10	<2.10	0	Diff <2x LOR	----
		Carbon disulfide	75-15-0	E621B	0.51	ppbv	<0.51	<0.51	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E621B	0.20	ppbv	0.21	0.21	0.005	Diff <2x LOR	----
		Chloroform	67-66-3	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Chloromethane	74-87-3	E621B	0.20	ppbv	0.93	0.84	0.09	Diff <2x LOR	----
		Cyclohexane	110-82-7	E621B	44.6	ppbv	487	482	1.00%	30%	----
		Dibromochloromethane	124-48-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E621B	0.20	ppbv	0.88	0.86	0.02	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E621B	0.20	ppbv	2.47	2.47	0.0329%	30%	----
		Dichloroethylene, 1,1-	75-35-4	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----



Sub-Matrix: Air					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1808681) - continued											
CG2417906-001	24VW-01	Dichloroethylene, cis-1,2-	156-59-2	E621B	0.20	ppbv	1.95	1.98	1.67%	30%	----
		Dichloroethylene, trans-1,2-	156-60-5	E621B	0.20	ppbv	0.63	0.60	0.03	Diff <2x LOR	----
		Dichloromethane	75-09-2	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichloropropylene, cis+trans-1,3-	542-75-6	E621B	0.3	ppbv	<0.30	<0.30	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.20	ppbv	0.27	0.26	0.01	Diff <2x LOR	----
		Dioxane, 1,4-	123-91-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Ethyl acetate	141-78-6	E621B	0.44	ppbv	<0.42	<0.44	0.02	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E621B	0.10	ppbv	0.57	0.56	0.005	Diff <2x LOR	----
		Ethyltoluene, 4-	622-96-8	E621B	0.20	ppbv	0.60	0.59	0.02	Diff <2x LOR	----
		Heptane, n-	142-82-5	E621B	44.6	ppbv	219	216	2.92	Diff <2x LOR	----
		Hexachlorobutadiene	87-68-3	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E621B	44.6	ppbv	1070	1070	0.128%	30%	----
		Hexanone, 2-	591-78-6	E621B	38.0	ppbv	<36.2	<38.0	1.8	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E621B	0.20	ppbv	0.42	0.41	0.004	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E621B	2.40	ppbv	<2.50	<2.40	0.10	Diff <2x LOR	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Naphthalene	91-20-3	E621B	0.10	ppbv	0.79	0.72	10.3%	30%	----
		Propylene	115-07-1	E621B	1.00	ppbv	33.3	32.6	2.08%	30%	----
		Styrene	100-42-5	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.24	ppbv	<0.24	<0.24	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Tetrahydrofuran	109-99-9	E621B	0.20	ppbv	0.40	0.41	0.009	Diff <2x LOR	----
		Toluene	108-88-3	E621B	0.10	ppbv	3.56	3.60	1.24%	30%	----
		Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E621B	0.20	ppbv	0.26	0.26	0.0004	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----



Sub-Matrix: Air					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1808681) - continued											
CG2417906-001	24VW-01	Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.20	ppbv	0.82	0.81	0.01	Diff <2x LOR	----
		Trimethylbenzene, 1,3,5-	108-67-8	E621B	1.00	ppbv	27.4	27.2	0.731%	30%	----
		Trimethylpentane, 2,2,4-	540-84-1	E621B	1.00	ppbv	28.3	29.0	2.39%	30%	----
		Vinyl acetate	108-05-4	E621B	112	ppbv	<120	<112	120	Diff <2x LOR	----
		Vinyl bromide	593-60-2	E621B	0.20	ppbv	<0.20	<0.20	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E621B	44.6	ppbv	94.7	97.0	2.30	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E621B	0.20	ppbv	1.59	1.57	1.30%	30%	----
Xylene, o-	95-47-6	E621B	0.10	ppbv	1.19	1.18	0.703%	30%	----		
Hydrocarbons (QC Lot: 1808682)											
CG2417906-001	24VW-01	F1 (C6-C10)	----	E593A	670	µg/m³	35600	35300	0.895%	30%	----
		F2 (C10-C16)	----	E593A	670	µg/m³	14900	14700	1.10%	30%	----
Hydrocarbons (QC Lot: 1808683)											
CG2417906-001	24VW-01	Aromatic (C10-C12)	----	E593C	670	µg/m³	1030	1010	19	Diff <2x LOR	----
		Aromatic (C12-C16)	----	E593C	1340	µg/m³	<1440	<1340	1440	Diff <2x LOR	----
		Aromatic (C6-C8)	----	E593C	670	µg/m³	<721	<670	721	Diff <2x LOR	----
		Aromatic (C8-C10)	----	E593C	670	µg/m³	<721	<670	721	Diff <2x LOR	----
		TVOC (C10-C12)	----	E593C	670	µg/m³	11500	11400	1.12%	50%	----
		TVOC (C12-C16)	----	E593C	1340	µg/m³	<1440	<1340	1440	Diff <2x LOR	----
		TVOC (C6-C8)	----	E593C	670	µg/m³	24600	24300	1.11%	50%	----
TVOC (C8-C10)	----	E593C	670	µg/m³	13700	13700	0.230%	50%	----		



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Field Tests (QCLot: 1804574)						
Pressure on receipt	---	EF001	0.1	Inches Hg	-30.0	---
Permanent Gases (QCLot: 1804339)						
Carbon dioxide	124-38-9	E629B-H	0.05	%	<0.050	---
Carbon monoxide	630-08-0	E629B-H	0.05	%	<0.050	---
Methane	74-82-8	E629B-H	0.05	%	<0.050	---
Nitrogen	7727-37-9	E629B-H	1	%	<1.0	---
Oxygen	7782-44-7	E629B-H	0.1	%	<0.10	---
Volatile Organic Compounds (QCLot: 1808681)						
Acetone	67-64-1	E621B	1	ppbv	<1.0	---
Allyl chloride	107-05-1	E621B	0.2	ppbv	<0.20	---
Benzene	71-43-2	E621B	0.1	ppbv	<0.10	---
Benzyl chloride	100-44-7	E621B	0.2	ppbv	<0.20	---
Bromodichloromethane	75-27-4	E621B	0.2	ppbv	<0.20	---
Bromoform	75-25-2	E621B	0.2	ppbv	<0.20	---
Bromomethane	74-83-9	E621B	0.2	ppbv	<0.20	---
Butadiene, 1,3-	106-99-0	E621B	0.2	ppbv	<0.20	---
Carbon disulfide	75-15-0	E621B	0.5	ppbv	<0.50	---
Carbon tetrachloride	56-23-5	E621B	0.2	ppbv	<0.20	---
Chlorobenzene	108-90-7	E621B	0.2	ppbv	<0.20	---
Chloroethane	75-00-3	E621B	0.2	ppbv	<0.20	---
Chloroform	67-66-3	E621B	0.2	ppbv	<0.20	---
Chloromethane	74-87-3	E621B	0.2	ppbv	<0.20	---
Cyclohexane	110-82-7	E621B	0.2	ppbv	<0.20	---
Dibromochloromethane	124-48-1	E621B	0.2	ppbv	<0.20	---
Dibromoethane, 1,2-	106-93-4	E621B	0.2	ppbv	<0.20	---
Dichlorobenzene, 1,2-	95-50-1	E621B	0.2	ppbv	<0.20	---
Dichlorobenzene, 1,3-	541-73-1	E621B	0.2	ppbv	<0.20	---
Dichlorobenzene, 1,4-	106-46-7	E621B	0.2	ppbv	<0.20	---
Dichlorodifluoromethane	75-71-8	E621B	0.2	ppbv	<0.20	---
Dichloroethane, 1,1-	75-34-3	E621B	0.2	ppbv	<0.20	---
Dichloroethane, 1,2-	107-06-2	E621B	0.2	ppbv	<0.20	---
Dichloroethylene, 1,1-	75-35-4	E621B	0.2	ppbv	<0.20	---



Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1808681) - continued						
Dichloroethylene, cis-1,2-	156-59-2	E621B	0.2	ppbv	<0.20	----
Dichloroethylene, trans-1,2-	156-60-5	E621B	0.2	ppbv	<0.20	----
Dichloromethane	75-09-2	E621B	0.2	ppbv	<0.20	----
Dichloropropane, 1,2-	78-87-5	E621B	0.2	ppbv	<0.20	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.2	ppbv	<0.20	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.2	ppbv	<0.20	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.2	ppbv	<0.20	----
Dioxane, 1,4-	123-91-1	E621B	0.2	ppbv	<0.20	----
Ethyl acetate	141-78-6	E621B	0.2	ppbv	<0.20	----
Ethylbenzene	100-41-4	E621B	0.1	ppbv	<0.10	----
Ethyltoluene, 4-	622-96-8	E621B	0.2	ppbv	<0.20	----
Heptane, n-	142-82-5	E621B	0.2	ppbv	<0.20	----
Hexachlorobutadiene	87-68-3	E621B	0.2	ppbv	<0.20	----
Hexane, n-	110-54-3	E621B	0.2	ppbv	<0.20	----
Hexanone, 2-	591-78-6	E621B	1	ppbv	<1.0	----
Isopropylbenzene	98-82-8	E621B	0.2	ppbv	<0.20	----
Methyl ethyl ketone [MEK]	78-93-3	E621B	0.2	ppbv	<0.20	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.2	ppbv	<0.20	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.2	ppbv	<0.20	----
Naphthalene	91-20-3	E621B	0.1	ppbv	<0.10	----
Propylene	115-07-1	E621B	0.2	ppbv	<0.20	----
Styrene	100-42-5	E621B	0.2	ppbv	<0.20	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.2	ppbv	<0.20	----
Tetrachloroethylene	127-18-4	E621B	0.2	ppbv	<0.20	----
Tetrahydrofuran	109-99-9	E621B	0.2	ppbv	<0.20	----
Toluene	108-88-3	E621B	0.1	ppbv	<0.10	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.2	ppbv	<0.20	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.2	ppbv	<0.20	----
Trichloroethane, 1,1,1-	71-55-6	E621B	0.2	ppbv	<0.20	----
Trichloroethane, 1,1,2-	79-00-5	E621B	0.2	ppbv	<0.20	----
Trichloroethylene	79-01-6	E621B	0.2	ppbv	<0.20	----
Trichlorofluoromethane	75-69-4	E621B	0.2	ppbv	<0.20	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.2	ppbv	<0.20	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.2	ppbv	<0.20	----
Trimethylpentane, 2,2,4-	540-84-1	E621B	0.2	ppbv	<0.20	----



Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1808681) - continued						
Vinyl acetate	108-05-4	E621B	0.5	ppbv	<0.50	----
Vinyl bromide	593-60-2	E621B	0.2	ppbv	<0.20	----
Vinyl chloride	75-01-4	E621B	0.2	ppbv	<0.20	----
Xylene, m+p-	179601-23-1	E621B	0.2	ppbv	<0.20	----
Xylene, o-	95-47-6	E621B	0.1	ppbv	<0.10	----
Hydrocarbons (QCLot: 1808682)						
F1 (C6-C10)	----	E593A	15	µg/m³	<15	----
F2 (C10-C16)	----	E593A	15	µg/m³	<15	----
Hydrocarbons (QCLot: 1808683)						
Aromatic (C10-C12)	----	E593C	15	µg/m³	<15	----
Aromatic (C12-C16)	----	E593C	30	µg/m³	<30	----
Aromatic (C6-C8)	----	E593C	15	µg/m³	<15	----
Aromatic (C8-C10)	----	E593C	15	µg/m³	<15	----
TVOC (C10-C12)	----	E593C	15	µg/m³	<15	----
TVOC (C12-C16)	----	E593C	30	µg/m³	<30	----
TVOC (C6-C8)	----	E593C	15	µg/m³	<15	----
TVOC (C8-C10)	----	E593C	15	µg/m³	<15	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Permanent Gases (QCLot: 1804339)									
Carbon dioxide	124-38-9	E629B-H	0.05	%	4.98 %	95.5	70.0	130	----
Carbon monoxide	630-08-0	E629B-H	0.05	%	0.747 %	100	70.0	130	----
Methane	74-82-8	E629B-H	0.05	%	15 %	100	70.0	130	----
Nitrogen	7727-37-9	E629B-H	1	%	50.4 %	96.6	70.0	130	----
Oxygen	7782-44-7	E629B-H	0.1	%	7.41 %	99.4	70.0	130	----
Volatile Organic Compounds (QCLot: 1808681)									
Acetone	67-64-1	E621B	1	ppbv	1.06 ppbv	110	70.0	130	----
Allyl chloride	107-05-1	E621B	0.2	ppbv	1.04 ppbv	109	70.0	130	----
Benzene	71-43-2	E621B	0.1	ppbv	1.06 ppbv	96.3	70.0	130	----
Benzyl chloride	100-44-7	E621B	0.2	ppbv	1.06 ppbv	# 61.8	70.0	130	LCS-ND
Bromodichloromethane	75-27-4	E621B	0.2	ppbv	1.02 ppbv	99.5	70.0	130	----
Bromoform	75-25-2	E621B	0.2	ppbv	1.06 ppbv	83.1	70.0	130	----
Bromomethane	74-83-9	E621B	0.2	ppbv	1.04 ppbv	96.8	70.0	130	----
Butadiene, 1,3-	106-99-0	E621B	0.2	ppbv	1.06 ppbv	90.7	70.0	130	----
Carbon disulfide	75-15-0	E621B	0.5	ppbv	1.06 ppbv	98.8	70.0	130	----
Carbon tetrachloride	56-23-5	E621B	0.2	ppbv	1.06 ppbv	99.2	70.0	130	----
Chlorobenzene	108-90-7	E621B	0.2	ppbv	1.07 ppbv	85.9	70.0	130	----
Chloroethane	75-00-3	E621B	0.2	ppbv	1.01 ppbv	103	70.0	130	----
Chloroform	67-66-3	E621B	0.2	ppbv	1.05 ppbv	97.3	70.0	130	----
Chloromethane	74-87-3	E621B	0.2	ppbv	1.01 ppbv	99.0	70.0	130	----
Cyclohexane	110-82-7	E621B	0.2	ppbv	1.06 ppbv	103	70.0	130	----
Dibromochloromethane	124-48-1	E621B	0.2	ppbv	1.07 ppbv	90.6	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E621B	0.2	ppbv	1.08 ppbv	89.2	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E621B	0.2	ppbv	1.06 ppbv	79.0	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E621B	0.2	ppbv	1.06 ppbv	81.0	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E621B	0.2	ppbv	1.05 ppbv	79.2	70.0	130	----
Dichlorodifluoromethane	75-71-8	E621B	0.2	ppbv	1.02 ppbv	94.4	70.0	130	----
Dichloroethane, 1,1-	75-34-3	E621B	0.2	ppbv	1.04 ppbv	99.5	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E621B	0.2	ppbv	1.04 ppbv	106	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E621B	0.2	ppbv	1.04 ppbv	99.8	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E621B	0.2	ppbv	1.06 ppbv	105	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E621B	0.2	ppbv	1.06 ppbv	103	70.0	130	----



Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1808681) - continued									
Dichloromethane	75-09-2	E621B	0.2	ppbv	1.04 ppbv	100	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E621B	0.2	ppbv	1.05 ppbv	95.8	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.2	ppbv	1.05 ppbv	95.3	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.2	ppbv	1.07 ppbv	94.6	70.0	130	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.2	ppbv	0.97 ppbv	93.0	70.0	130	----
Dioxane, 1,4-	123-91-1	E621B	0.2	ppbv	1.07 ppbv	84.8	70.0	130	----
Ethyl acetate	141-78-6	E621B	0.2	ppbv	1.05 ppbv	102	70.0	130	----
Ethylbenzene	100-41-4	E621B	0.1	ppbv	1.09 ppbv	86.8	70.0	130	----
Ethyltoluene, 4-	622-96-8	E621B	0.2	ppbv	1.06 ppbv	87.5	70.0	130	----
Heptane, n-	142-82-5	E621B	0.2	ppbv	1.06 ppbv	104	70.0	130	----
Hexachlorobutadiene	87-68-3	E621B	0.2	ppbv	1.09 ppbv	82.1	70.0	130	----
Hexane, n-	110-54-3	E621B	0.2	ppbv	1.07 ppbv	105	70.0	130	----
Hexanone, 2-	591-78-6	E621B	1	ppbv	1.09 ppbv	88.5	70.0	130	----
Isopropylbenzene	98-82-8	E621B	0.2	ppbv	1.04 ppbv	87.0	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E621B	0.2	ppbv	1.07 ppbv	105	70.0	130	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.2	ppbv	1.07 ppbv	94.1	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.2	ppbv	1.07 ppbv	101	70.0	130	----
Naphthalene	91-20-3	E621B	0.1	ppbv	1.12 ppbv	93.0	70.0	130	----
Propylene	115-07-1	E621B	0.2	ppbv	1.08 ppbv	106	70.0	130	----
Styrene	100-42-5	E621B	0.2	ppbv	1.06 ppbv	87.3	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.2	ppbv	1.07 ppbv	84.3	70.0	130	----
Tetrachloroethylene	127-18-4	E621B	0.2	ppbv	1.04 ppbv	87.1	70.0	130	----
Tetrahydrofuran	109-99-9	E621B	0.2	ppbv	1.04 ppbv	99.2	70.0	130	----
Toluene	108-88-3	E621B	0.1	ppbv	1.09 ppbv	96.9	70.0	130	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.2	ppbv	1.03 ppbv	92.6	70.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.2	ppbv	1.07 ppbv	87.0	70.0	130	----
Trichloroethane, 1,1,1-	71-55-6	E621B	0.2	ppbv	1.05 ppbv	99.1	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E621B	0.2	ppbv	1.08 ppbv	87.7	70.0	130	----
Trichloroethylene	79-01-6	E621B	0.2	ppbv	1.08 ppbv	91.7	70.0	130	----
Trichlorofluoromethane	75-69-4	E621B	0.2	ppbv	1.07 ppbv	99.6	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.2	ppbv	1.07 ppbv	89.3	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.2	ppbv	1.06 ppbv	86.5	70.0	130	----
Trimethylpentane, 2,2,4-	540-84-1	E621B	0.2	ppbv	1.06 ppbv	100	70.0	130	----
Vinyl acetate	108-05-4	E621B	0.5	ppbv	1.1 ppbv	90.7	70.0	130	----
Vinyl bromide	593-60-2	E621B	0.2	ppbv	1.04 ppbv	99.9	70.0	130	----
Vinyl chloride	75-01-4	E621B	0.2	ppbv	1.01 ppbv	104	70.0	130	----



Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1808681) - continued									
Xylene, m+p-	179601-23-1	E621B	0.2	ppbv	2.12 ppbv	88.8	70.0	130	----
Xylene, o-	95-47-6	E621B	0.1	ppbv	1.07 ppbv	89.3	70.0	130	----
Hydrocarbons (QCLot: 1808682)									
F1 (C6-C10)	----	E593A	15	µg/m ³	815 µg/m ³	89.6	50.0	150	----
Hydrocarbons (QCLot: 1808683)									
Aromatic (C10-C12)	----	E593C	15	µg/m ³	60.8 µg/m ³	102	50.0	150	----
Aromatic (C12-C16)	----	E593C	30	µg/m ³	60.1 µg/m ³	129	50.0	150	----
Aromatic (C6-C8)	----	E593C	15	µg/m ³	60.1 µg/m ³	98.6	50.0	150	----
Aromatic (C8-C10)	----	E593C	15	µg/m ³	59.6 µg/m ³	107	50.0	150	----
TVOC (C10-C12)	----	E593C	15	µg/m ³	121 µg/m ³	105	50.0	150	----
TVOC (C12-C16)	----	E593C	30	µg/m ³	120 µg/m ³	126	50.0	150	----
TVOC (C6-C8)	----	E593C	15	µg/m ³	120 µg/m ³	105	50.0	150	----
TVOC (C8-C10)	----	E593C	15	µg/m ³	119 µg/m ³	100	50.0	150	----

Qualifiers

Qualifier	Description
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

Batch Proof Report



right solutions.
right partner.

Batch Proof ID: 241025.127
Canister ID: 01400-0512
Analysis Date: 14-Nov-24

1,1,1-Trichloroethane	<0.02	ppb(V)	cis-1,3-Dichloropropene	<0.02	ppb(V)
1,1,1,2-Tetrachloroethane	<0.02	ppb(V)	Cyclohexane	<0.20	ppb(V)
1,1,2,2-Tetrachloroethane	<0.02	ppb(V)	Dibromochloromethane	<0.20	ppb(V)
1,1,2-Trichloroethane	<0.02	ppb(V)	Dichlorodifluoromethane	<0.20	ppb(V)
1,1-Dichloroethane	<0.02	ppb(V)	Ethyl Acetate	<0.20	ppb(V)
1,1-Dichloroethene	<0.02	ppb(V)	Ethyl Benzene	<0.02	ppb(V)
1,2,4-Trichlorobenzene	<0.20	ppb(V)	Freon 113	<0.20	ppb(V)
1,2,4-Trimethylbenzene	<0.20	ppb(V)	Freon 114	<0.20	ppb(V)
1,2-Dibromoethane	<0.01	ppb(V)	Hexachlorobutadiene	<0.02	ppb(V)
1,2-Dichlorobenzene	<0.02	ppb(V)	Isooctane	<0.20	ppb(V)
1,2-Dichloroethane	<0.01	ppb(V)	Isopropyl Alcohol	<0.20	ppb(V)
1,2-Dichloropropane	<0.02	ppb(V)	Isopropylbenzene	<0.20	ppb(V)
1,3,5-Trimethylbenzene	<0.20	ppb(V)	m&p-Xylene	<0.04	ppb(V)
1,3-Butadiene	<0.20	ppb(V)	Methyl Ethyl Ketone	<0.20	ppb(V)
1,3-Dichlorobenzene	<0.02	ppb(V)	Methylcyclohexane	<0.20	ppb(V)
1,4-Dichlorobenzene	<0.02	ppb(V)	Methyl Isobutyl Ketone	<0.20	ppb(V)
1,4-Dioxane	<0.20	ppb(V)	Methylene Chloride	<0.02	ppb(V)
2-Chlorophenol	<0.20	ppb(V)	MTBE	<0.20	ppb(V)
2-Hexanone	<1.0	ppb(V)	Naphthalene	<0.05	ppb(V)
4-Ethyltoluene	<0.20	ppb(V)	n-Decane	<0.20	ppb(V)
Acetone	<1.0	ppb(V)	n-Heptane	<0.20	ppb(V)
Acrolein	<0.10	ppb(V)	n-Hexane	<0.02	ppb(V)
Allyl Chloride	<0.20	ppb(V)	o-Xylene	<0.02	ppb(V)
Benzene	<0.02	ppb(V)	Propylene	<0.20	ppb(V)
Benzyl Chloride	<0.20	ppb(V)	Styrene	<0.02	ppb(V)
Bromodichloromethane	<0.20	ppb(V)	Tetrachloroethylene	<0.02	ppb(V)
Bromobenzene	<0.20	ppb(V)	Tetrahydrofuran	<0.20	ppb(V)
Bromoform	<0.02	ppb(V)	Toluene	<0.02	ppb(V)
Bromomethane	<0.20	ppb(V)	trans-1,2-Dichloroethene	<0.02	ppb(V)
Carbon Disulfide	<0.50	ppb(V)	trans-1,3-Dichloropropene	<0.02	ppb(V)
Carbon Tetrachloride	<0.02	ppb(V)	Trichloroethylene	<0.02	ppb(V)
Chlorobenzene	<0.20	ppb(V)	Trichlorofluoromethane	<0.20	ppb(V)
Chloroethane	<0.02	ppb(V)	Vinyl Acetate	<0.50	ppb(V)
Chloroform	<0.02	ppb(V)	Vinyl Bromide	<0.20	ppb(V)
Chloromethane	<0.20	ppb(V)	Vinyl Chloride	<0.02	ppb(V)
cis-1,2-Dichloroethene	<0.02	ppb(V)	4-Bromofluorobenzene	99.40	%

Batch Proof Report



right solutions.
right partner.

Batch Proof ID: 241111.128

Canister ID: 01400-0505

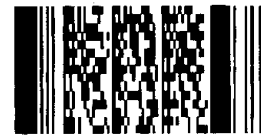
Analysis Date: 24-Nov-24

1,1,1-Trichloroethane	<0.02	ppb(V)	cis-1,3-Dichloropropene	<0.02	ppb(V)
1,1,1,2-Tetrachloroethane	<0.02	ppb(V)	Cyclohexane	<0.20	ppb(V)
1,1,2,2-Tetrachloroethane	<0.02	ppb(V)	Dibromochloromethane	<0.20	ppb(V)
1,1,2-Trichloroethane	<0.02	ppb(V)	Dichlorodifluoromethane	<0.20	ppb(V)
1,1-Dichloroethane	<0.02	ppb(V)	Ethyl Acetate	<0.20	ppb(V)
1,1-Dichloroethene	<0.02	ppb(V)	Ethyl Benzene	<0.02	ppb(V)
1,2,4-Trichlorobenzene	<0.20	ppb(V)	Freon 113	<0.20	ppb(V)
1,2,4-Trimethylbenzene	<0.20	ppb(V)	Freon 114	<0.20	ppb(V)
1,2-Dibromoethane	<0.01	ppb(V)	Hexachlorobutadiene	<0.02	ppb(V)
1,2-Dichlorobenzene	<0.02	ppb(V)	Isooctane	<0.20	ppb(V)
1,2-Dichloroethane	<0.01	ppb(V)	Isopropyl Alcohol	<0.20	ppb(V)
1,2-Dichloropropane	<0.02	ppb(V)	Isopropylbenzene	<0.20	ppb(V)
1,3,5-Trimethylbenzene	<0.20	ppb(V)	m&p-Xylene	<0.04	ppb(V)
1,3-Butadiene	<0.20	ppb(V)	Methyl Ethyl Ketone	<0.20	ppb(V)
1,3-Dichlorobenzene	<0.02	ppb(V)	Methylcyclohexane	<0.20	ppb(V)
1,4-Dichlorobenzene	<0.02	ppb(V)	Methyl Isobutyl Ketone	<0.20	ppb(V)
1,4-Dioxane	<0.20	ppb(V)	Methylene Chloride	<0.02	ppb(V)
2-Chlorophenol	<0.20	ppb(V)	MTBE	<0.20	ppb(V)
2-Hexanone	<1.0	ppb(V)	Naphthalene	<0.05	ppb(V)
4-Ethyltoluene	<0.20	ppb(V)	n-Decane	<0.20	ppb(V)
Acetone	<1.0	ppb(V)	n-Heptane	<0.20	ppb(V)
Acrolein	<0.10	ppb(V)	n-Hexane	<0.02	ppb(V)
Allyl Chloride	<0.20	ppb(V)	o-Xylene	<0.02	ppb(V)
Benzene	<0.02	ppb(V)	Propylene	<0.20	ppb(V)
Benzyl Chloride	<0.20	ppb(V)	Styrene	<0.02	ppb(V)
Bromodichloromethane	<0.20	ppb(V)	Tetrachloroethylene	<0.02	ppb(V)
Bromobenzene	<0.20	ppb(V)	Tetrahydrofuran	<0.20	ppb(V)
Bromoform	<0.02	ppb(V)	Toluene	<0.02	ppb(V)
Bromomethane	<0.20	ppb(V)	trans-1,2-Dichloroethene	<0.02	ppb(V)
Carbon Disulfide	<0.50	ppb(V)	trans-1,3-Dichloropropene	<0.02	ppb(V)
Carbon Tetrachloride	<0.02	ppb(V)	Trichloroethylene	<0.02	ppb(V)
Chlorobenzene	<0.20	ppb(V)	Trichlorofluoromethane	<0.20	ppb(V)
Chloroethane	<0.02	ppb(V)	Vinyl Acetate	<0.50	ppb(V)
Chloroform	<0.02	ppb(V)	Vinyl Bromide	<0.20	ppb(V)
Chloromethane	<0.20	ppb(V)	Vinyl Chloride	<0.02	ppb(V)
cis-1,2-Dichloroethene	<0.02	ppb(V)	4-Bromofluorobenzene	98.82	%



Report to:		Report Format / Distribution			Service Requested:																
Company: Tetra Tech Canada Inc.		<input type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="checkbox"/> Regular Service (Default)																
Contact: Darby Madalena		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax			<input type="checkbox"/> Rush Service (2-3 Days)																
Address: 110, 140 Quarry Park Blvd SE, Calgary, AB T2C 3G3		Email 1: darby.madalena@tetratech.com			<input type="checkbox"/> Priority Service (1 Day or ASAP)																
Phone: 403-723-6867 Fax: 403-203-3301		Email 2: jaymes.going@tetratech.com			<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS																
Invoice To: <input checked="" type="checkbox"/> Same as Report		ALS Digital Crosstab results			Analysis Request																
Company: SAME AS REPORT		Indicate Bottles: Filtered / Preserved (F/P) →→																			
Contact:		Client / Project Information:																			
Address:		Job #: SWM.SWOP04071-04.004																			
Sample		PO/AFE: SWM.SWOP04071-04.004																			
Phone:		Legal Site Description:																			
Fax:		Quote #: CG22-EBAE100-0021																			
Lab Work Order # (lab use only)		ALS Contact: Patryk Wojciak			Sampler (Initials):																
Sample #	Sample Identification (This description will appear on the report)			Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	EP592	S621E - Aliphatic and Aromatic	S629B - Methane, CO2, CO										Hazardous?	Highly Contaminated?	Number of Containers
24VW-01				3 Dec 24		Air	X	X	X												
VW-04				3 Dec 24		Air	X	X	X												
Duplicate				3 Dec 24		Air	X	X	X												
Guidelines / Regulations												Special Instructions / Hazardous Details									
												Do not analyse VW-02									
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																					
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet																					
Relinquished By:	W Cadalaga	Date & Time:	3 Dec 24 5:30P	Received By:		Date & Time:		Sample Cor													
Relinquished By:		Date & Time:		Received By:	M	Date & Time:	12:4 835	Temperature	11	Samples Condition:	provided details)										

Environmental Division
Calgary
Work Order Reference
CG2417906



Telephone: +1 403 407 1800



CERTIFICATE OF ANALYSIS

Work Order	: CG2502145		
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Waterloo
Contact	: Darby Madalena	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary Alberta Canada T2C 3G3	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: 403 203 3355	Telephone	: +1 519 886 6910
Project	: SWM.SWOP04071-04.004	Date Samples Received	: 26-Feb-2025 15:15
PO	: SWM.SWOP04071-04.004	Date Analysis Commenced	: 05-Mar-2025
C-O-C number	: CORD RDM VWs	Issue Date	: 12-Mar-2025 15:25
Sampler	: Willem Verdun		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Andrea Armstrong	Department Manager - Air Quality and Volatiles	Air Quality, Waterloo, Ontario



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	no units
%	percent
inches Hg	inches of mercury
ppbv	parts per billion (volume/volume)
µg/m ³	micrograms per cubic metre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
AI	Analytical interferences may be present. Result may be biased high.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLQ	Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	
					Result	----	----	----	----	
Field Tests										
ID, batch proof	----	EF001/WT	-	-	250108.108	----	----	----	----	
ID, canister	----	EF001/WT	-	-	01400-0524	----	----	----	----	
ID, regulator	----	EF001/WT	-	-	G382	----	----	----	----	
Pressure on receipt	----	EF001/WT	0.10	inches Hg	-11.2	----	----	----	----	
Permanent Gases										
Carbon dioxide	124-38-9	E629B-H/WT	0.050	%	5.56	----	----	----	----	
Carbon monoxide	630-08-0	E629B-H/WT	0.050	%	<0.050	----	----	----	----	
Methane	74-82-8	E629B-H/WT	0.050	%	0.648	----	----	----	----	
Nitrogen	7727-37-9	E629B-H/WT	1.0	%	79.4	----	----	----	----	
Oxygen	7782-44-7	E629B-H/WT	0.10	%	14.0	----	----	----	----	
Volatile Organic Compounds										
Acetone	67-64-1	EC621B/WT	2.4	µg/m³	<12.8	----	----	----	----	
Acetone	67-64-1	E621B/WT	1.0	ppbv	<5.4 ^{DLHC, AI}	----	----	----	----	
Allyl chloride	107-05-1	EC621B/WT	0.63	µg/m³	<3.38	----	----	----	----	
Allyl chloride	107-05-1	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Benzene	71-43-2	EC621B/WT	0.32	µg/m³	28.8	----	----	----	----	
Benzene	71-43-2	E621B/WT	0.10	ppbv	9.02 ^{DLHC}	----	----	----	----	
Benzyl chloride	100-44-7	EC621B/WT	1.0	µg/m³	<5.6	----	----	----	----	
Benzyl chloride	100-44-7	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Bromodichloromethane	75-27-4	EC621B/WT	1.3	µg/m³	<7.2	----	----	----	----	
Bromodichloromethane	75-27-4	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	----
						Result	----	----	----	----
Volatile Organic Compounds										
Bromoform	75-25-2	EC621B/WT	2.1	µg/m³	<11.2	----	----	----	----	----
Bromoform	75-25-2	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Bromomethane	74-83-9	EC621B/WT	0.78	µg/m³	<4.19	----	----	----	----	----
Bromomethane	74-83-9	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Butadiene, 1,3-	106-99-0	EC621B/WT	0.44	µg/m³	<2.39	----	----	----	----	----
Butadiene, 1,3-	106-99-0	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Carbon disulfide	75-15-0	EC621B/WT	1.6	µg/m³	<8.4	----	----	----	----	----
Carbon disulfide	75-15-0	E621B/WT	0.50	ppbv	<2.70 DLHC	----	----	----	----	----
Carbon tetrachloride	56-23-5	EC621B/WT	1.30	µg/m³	<6.79	----	----	----	----	----
Carbon tetrachloride	56-23-5	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Chlorobenzene	108-90-7	EC621B/WT	0.92	µg/m³	<4.97	----	----	----	----	----
Chlorobenzene	108-90-7	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Chloroethane	75-00-3	EC621B/WT	0.53	µg/m³	<2.85	----	----	----	----	----
Chloroethane	75-00-3	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Chloroform	67-66-3	EC621B/WT	0.98	µg/m³	<5.27	----	----	----	----	----
Chloroform	67-66-3	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Chloromethane	74-87-3	EC621B/WT	0.41	µg/m³	<2.23	----	----	----	----	----
Chloromethane	74-87-3	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Cyclohexane	110-82-7	EC621B/WT	0.69	µg/m³	2510	----	----	----	----	----
Cyclohexane	110-82-7	E621B/WT	0.20	ppbv	730	----	----	----	----	----
Dibromochloromethane	124-48-1	EC621B/WT	1.7	µg/m³	<9.2	----	----	----	----	----



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	----
						Result	----	----	----	----
Volatile Organic Compounds										
Dibromochloromethane	124-48-1	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dibromoethane, 1,2-	106-93-4	EC621B/WT	1.5	µg/m³	<8.3	----	----	----	----	----
Dibromoethane, 1,2-	106-93-4	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	EC621B/WT	1.2	µg/m³	<6.5	----	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichlorobenzene, 1,3-	541-73-1	EC621B/WT	1.2	µg/m³	<6.5	----	----	----	----	----
Dichlorobenzene, 1,3-	541-73-1	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	EC621B/WT	1.2	µg/m³	12.6	----	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	E621B/WT	0.20	ppbv	2.09 ^{DLHC}	----	----	----	----	----
Dichlorodifluoromethane	75-71-8	EC621B/WT	1.0	µg/m³	142	----	----	----	----	----
Dichlorodifluoromethane	75-71-8	E621B/WT	0.20	ppbv	28.7	----	----	----	----	----
Dichloroethane, 1,1-	75-34-3	EC621B/WT	0.81	µg/m³	<4.37	----	----	----	----	----
Dichloroethane, 1,1-	75-34-3	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichloroethane, 1,2-	107-06-2	EC621B/WT	0.81	µg/m³	6.48	----	----	----	----	----
Dichloroethane, 1,2-	107-06-2	E621B/WT	0.20	ppbv	1.60 ^{DLHC, AI}	----	----	----	----	----
Dichloroethylene, 1,1-	75-35-4	EC621B/WT	0.79	µg/m³	<4.28	----	----	----	----	----
Dichloroethylene, 1,1-	75-35-4	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	EC621B/WT	0.79	µg/m³	<4.28	----	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichloroethylene, trans-1,2-	156-60-5	EC621B/WT	0.79	µg/m³	4.76	----	----	----	----	----
Dichloroethylene, trans-1,2-	156-60-5	E621B/WT	0.20	ppbv	1.20 ^{DLHC}	----	----	----	----	----



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	----
						Result	----	----	----	----
Volatile Organic Compounds										
Dichloromethane	75-09-2	EC621B/WT	0.69	µg/m³	<3.75	----	----	----	----	----
Dichloromethane	75-09-2	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichloropropane, 1,2-	78-87-5	EC621B/WT	0.9	µg/m³	<5.0	----	----	----	----	----
Dichloropropane, 1,2-	78-87-5	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichloropropylene, cis-1,3-	10061-01-5	EC621B/WT	0.9	µg/m³	<4.9	----	----	----	----	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichloropropylene, cis+trans-1,3-	542-75-6	EC621B/WT	1.3	µg/m³	<9.8	----	----	----	----	----
Dichloropropylene, cis+trans-1,3-	542-75-6	E621B/WT	0.30	ppbv	<1.53 ^{DLHC}	----	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	EC621B/WT	0.9	µg/m³	<4.9	----	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	EC621B/WT	1.4	µg/m³	58.0	----	----	----	----	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B/WT	0.20	ppbv	8.29 ^{DLHC}	----	----	----	----	----
Dioxane, 1,4-	123-91-1	EC621B/WT	0.72	µg/m³	<3.89	----	----	----	----	----
Dioxane, 1,4-	123-91-1	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Ethyl acetate	141-78-6	EC621B/WT	0.72	µg/m³	<3.89	----	----	----	----	----
Ethyl acetate	141-78-6	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	----
Ethylbenzene	100-41-4	EC621B/WT	0.43	µg/m³	50.4	----	----	----	----	----
Ethylbenzene	100-41-4	E621B/WT	0.10	ppbv	11.6 ^{DLHC}	----	----	----	----	----
Ethyltoluene, 4-	622-96-8	EC621B/WT	1.0	µg/m³	61.9	----	----	----	----	----
Ethyltoluene, 4-	622-96-8	E621B/WT	0.20	ppbv	12.6 ^{DLHC}	----	----	----	----	----
Heptane, n-	142-82-5	EC621B/WT	0.82	µg/m³	1460	----	----	----	----	----



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	
						Result	----	----	----	----
Volatile Organic Compounds										
Heptane, n-	142-82-5	E621B/WT	0.20	ppbv	357	----	----	----	----	
Hexachlorobutadiene	87-68-3	EC621B/WT	2.1	µg/m³	<11.5	----	----	----	----	
Hexachlorobutadiene	87-68-3	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Hexane, n-	110-54-3	EC621B/WT	0.70	µg/m³	1190	----	----	----	----	
Hexane, n-	110-54-3	E621B/WT	0.20	ppbv	338	----	----	----	----	
Hexanone, 2-	591-78-6	EC621B/WT	4.10	µg/m³	<311	----	----	----	----	
Hexanone, 2-	591-78-6	E621B/WT	1.0	ppbv	<76.0 ^{DLO}	----	----	----	----	
Isopropylbenzene	98-82-8	EC621B/WT	1.0	µg/m³	10.8	----	----	----	----	
Isopropylbenzene	98-82-8	E621B/WT	0.20	ppbv	2.20 ^{DLHC}	----	----	----	----	
Methyl ethyl ketone [MEK]	78-93-3	EC621B/WT	0.59	µg/m³	<3.18	----	----	----	----	
Methyl ethyl ketone [MEK]	78-93-3	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Methyl isobutyl ketone [MIBK]	108-10-1	EC621B/WT	0.82	µg/m³	<4.42	----	----	----	----	
Methyl isobutyl ketone [MIBK]	108-10-1	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	EC621B/WT	0.72	µg/m³	<3.89	----	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Naphthalene	91-20-3	EC621B/WT	0.52	µg/m³	6.24	----	----	----	----	
Naphthalene	91-20-3	E621B/WT	0.10	ppbv	1.19 ^{DLHC}	----	----	----	----	
Propylene	115-07-1	EC621B/WT	0.34	µg/m³	<23.1	----	----	----	----	
Propylene	115-07-1	E621B/WT	0.20	ppbv	<13.4 ^{DLO}	----	----	----	----	
Styrene	100-42-5	EC621B/WT	0.85	µg/m³	<4.60	----	----	----	----	
Styrene	100-42-5	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	----
						Result	----	----	----	----
Volatile Organic Compounds										
Tetrachloroethane, 1,1,2,2-	79-34-5	EC621B/WT	1.4	µg/m³	<7.4	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Tetrachloroethylene	127-18-4	EC621B/WT	1.4	µg/m³	<7.3	----	----	----	----	----
Tetrachloroethylene	127-18-4	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Tetrahydrofuran	109-99-9	EC621B/WT	0.59	µg/m³	<3.18	----	----	----	----	----
Tetrahydrofuran	109-99-9	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Toluene	108-88-3	EC621B/WT	0.38	µg/m³	4.07	----	----	----	----	----
Toluene	108-88-3	E621B/WT	0.10	ppbv	1.08 DLHC	----	----	----	----	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	EC621B/WT	1.5	µg/m³	<8.3	----	----	----	----	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Trichlorobenzene, 1,2,4-	120-82-1	EC621B/WT	1.5	µg/m³	<8.0	----	----	----	----	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Trichloroethane, 1,1,1-	71-55-6	EC621B/WT	1.1	µg/m³	<5.9	----	----	----	----	----
Trichloroethane, 1,1,1-	71-55-6	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Trichloroethane, 1,1,2-	79-00-5	EC621B/WT	1.1	µg/m³	<5.9	----	----	----	----	----
Trichloroethane, 1,1,2-	79-00-5	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Trichloroethylene	79-01-6	EC621B/WT	1.1	µg/m³	<5.8	----	----	----	----	----
Trichloroethylene	79-01-6	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Trichlorofluoromethane	75-69-4	EC621B/WT	1.1	µg/m³	<6.1	----	----	----	----	----
Trichlorofluoromethane	75-69-4	E621B/WT	0.20	ppbv	<1.08 DLHC	----	----	----	----	----
Trimethylbenzene, 1,2,4-	95-63-6	EC621B/WT	1.0	µg/m³	102	----	----	----	----	----



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	
						Result	----	----	----	----
Volatile Organic Compounds										
Trimethylbenzene, 1,2,4-	95-63-6	E621B/WT	0.20	ppbv	20.7 ^{DLHC}	----	----	----	----	
Trimethylbenzene, 1,3,5-	108-67-8	EC621B/WT	1.0	µg/m³	436	----	----	----	----	
Trimethylbenzene, 1,3,5-	108-67-8	E621B/WT	0.20	ppbv	88.7	----	----	----	----	
Trimethylpentane, 2,2,4-	540-84-1	EC621B/WT	0.9	µg/m³	282	----	----	----	----	
Trimethylpentane, 2,2,4-	540-84-1	E621B/WT	0.20	ppbv	60.3	----	----	----	----	
Vinyl acetate	108-05-4	EC621B/WT	1.8	µg/m³	<79.2	----	----	----	----	
Vinyl acetate	108-05-4	E621B/WT	0.50	ppbv	<22.5 ^{DLO}	----	----	----	----	
Vinyl bromide	593-60-2	EC621B/WT	0.9	µg/m³	<4.7	----	----	----	----	
Vinyl bromide	593-60-2	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Vinyl chloride	75-01-4	EC621B/WT	0.51	µg/m³	<2.76	----	----	----	----	
Vinyl chloride	75-01-4	E621B/WT	0.20	ppbv	<1.08 ^{DLHC}	----	----	----	----	
Xylene, m+p-	179601-23-1	EC621B/WT	0.87	µg/m³	265	----	----	----	----	
Xylene, m+p-	179601-23-1	E621B/WT	0.20	ppbv	61.0	----	----	----	----	
Xylene, o-	95-47-6	EC621B/WT	0.43	µg/m³	228	----	----	----	----	
Xylene, o-	95-47-6	E621B/WT	0.10	ppbv	52.6	----	----	----	----	
Xylenes, total	1330-20-7	EC621B/WT	1.3	µg/m³	493	----	----	----	----	
Xylenes, total	1330-20-7	E621B/WT	0.30	ppbv	114	----	----	----	----	
BTEX, total	----	EC621B/WT	1.2	µg/m³	576	----	----	----	----	
BTEX, total	----	E621B/WT	0.30	ppbv	135	----	----	----	----	
Hydrocarbons										
Aliphatic (C10-C12)	----	E593C/WT	15	µg/m³	7030 ^{DLHC}	----	----	----	----	



Analytical Results

Sub-Matrix: Canister
 (Matrix: Air)

					Client sample ID	25VW-04	----	----	----	----
					Client sampling date / time	26-Feb-2025 11:32	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2502145-001	----	----	----	----	
Result						----	----	----	----	
Hydrocarbons										
Aliphatic (C12-C16)	----	E593C/WT	30	µg/m³	202 DLHC	----	----	----	----	
Aliphatic (C6-C8)	----	E593C/WT	15	µg/m³	24800 DLHC	----	----	----	----	
Aliphatic (C8-C10)	----	E593C/WT	15	µg/m³	24200 DLHC	----	----	----	----	
Aromatic (C10-C12)	----	E593C/WT	15	µg/m³	1090 DLHC	----	----	----	----	
Aromatic (C12-C16)	----	E593C/WT	30	µg/m³	<149 DLHC	----	----	----	----	
Aromatic (C6-C8)	----	E593C/WT	15	µg/m³	137 DLHC	----	----	----	----	
Aromatic (C8-C10)	----	E593C/WT	15	µg/m³	1760 DLHC	----	----	----	----	
F1 (C6-C10)	----	E593A/WT	15	µg/m³	44600 DLHC	----	----	----	----	
F1-BTEX	----	EC592A/WT	15	µg/m³	44000	----	----	----	----	
F2 (C10-C16)	----	E593A/WT	15	µg/m³	10700 DLHC	----	----	----	----	
F2-Naphthalene	----	EC593D/WT	15	µg/m³	10700	----	----	----	----	
TVOC (C10-C12)	----	E593C/WT	15	µg/m³	8120 DLHC	----	----	----	----	
TVOC (C12-C16)	----	E593C/WT	30	µg/m³	202 DLHC	----	----	----	----	
TVOC (C6-C8)	----	E593C/WT	15	µg/m³	24900 DLHC	----	----	----	----	
TVOC (C8-C10)	----	E593C/WT	15	µg/m³	26000 DLHC	----	----	----	----	
Hydrocarbons Surrogates										
Bromofluorobenzene, 4-	460-00-4	E593C/WT	1	%	95.2	----	----	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E621B/WT	0.20	%	90.0	----	----	----	----	

Please refer to the General Comments section for an explanation of any result qualifiers detected.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : CG2502145</p> <p>Client : Tetra Tech Canada Inc.</p> <p>Contact : Darby Madalena</p> <p>Address : 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3</p> <p>Telephone : 403 203 3355</p> <p>Project : SWM.SWOP04071-04.004</p> <p>PO : SWM.SWOP04071-04.004</p> <p>C-O-C number : CORD RDM VWs</p> <p>Sampler : Willem Verdun</p> <p>Site : ----</p> <p>Quote number : CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites</p> <p>No. of samples received : 1</p> <p>No. of samples analysed : 1</p>	<p>Page : 1 of 6</p> <p>Laboratory : ALS Environmental - Calgary</p> <p>Account Manager : Patryk Wojciak</p> <p>Address : 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5</p> <p>Telephone : +1 403 407 1800</p> <p>Date Samples Received : 26-Feb-2025 15:15</p> <p>Issue Date : 12-Mar-2025 15:25</p>
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This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
- DQO: Data Quality Objective.
- LOR: Limit of Reporting (detection limit).
- RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: Air

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Hydrocarbons	QC-1899961-001	----	F2 (C10-C16)	----	E593A	19 µg/m ³	15 µg/m ³	Blank result exceeds permitted value
Laboratory Control Sample (LCS) Recoveries								
Hydrocarbons	QC-1899962-002	----	Aromatic (C12-C16)	----	E593C	161 % ^{LCS-H}	50.0-150%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Air

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Field Tests : Air Canister Information										
Air Canister 25VW-04	EF001	26-Feb-2025	----	----	----		06-Mar-2025	----	8 days	
Hydrocarbons : TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)										
Air Canister 25VW-04	E593C	26-Feb-2025	----	----	----		07-Mar-2025	30 days	9 days	✔
Hydrocarbons : TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)										
Air Canister 25VW-04	E593A	26-Feb-2025	----	----	----		07-Mar-2025	30 days	9 days	✔
Permanent Gases : Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)										
Air Canister 25VW-04	E629B-H	26-Feb-2025	----	----	----		05-Mar-2025	30 days	7 days	✔
Volatile Organic Compounds : VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)										
Air Canister 25VW-04	E621B	26-Feb-2025	----	----	----		07-Mar-2025	30 days	9 days	✔

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Air

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	1899961	1	8	12.5	5.0	✔
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	1899962	1	8	12.5	5.0	✔
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	1899960	1	8	12.5	5.0	✔
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H	1895649	1	10	10.0	5.0	✔
Laboratory Control Samples (LCS)							
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	1899961	1	8	12.5	5.0	✔
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	1899962	1	8	12.5	5.0	✔
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	1899960	1	8	12.5	5.0	✔
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H	1895649	1	10	10.0	5.0	✔
Method Blanks (MB)							
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A	1899961	1	8	12.5	5.0	✔
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C	1899962	1	8	12.5	5.0	✔
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B	1899960	1	8	12.5	5.0	✔
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H	1895649	1	10	10.0	5.0	✔
Air Canister Information	EF001	1896736	1	12	8.3	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
TVOC (F1, F2) in Canisters or Bags by GC-MS (µg/m3)	E593A ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Total Volatile Organic Compounds (TVOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
TVOC (C6-C16) Fractionation in Canisters or Bags by GC-MS (ug/m3)	E593C ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Total Volatile Organic Compounds (TVOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ppbV)	E621B ALS Environmental - Waterloo	Air	EPA TO-15 (mod)	Volatile Organic Compounds (VOC) in canisters (or bags) are transferred to a preconcentrator system and then thermally desorbed prior to injection into a GC-MS system for analysis.
Permanent Gases (Methane, CO2, CO, N2, and O2) in Air (Routine Level, %)	E629B-H ALS Environmental - Waterloo	Air	EPA Method 3C & ASTM D1946	This analysis is performed using procedures adapted from EPA Method 3C & ASTM D1946. Air samples are collected into cleaned evacuated canisters. A volume of air is removed from the canister and injected by means of a gas-sampling/backflush valve onto a series of packed GC columns and measured using a thermal conductivity detector (TCD). Oxygen is not separated from Argon. Canister samples will be retained for 7 calendar days after final report. If you require a longer canister storage time, please contact your account manager.
F1-BTEX in Canisters or Bags GC-MS (µg/m3)	EC592A ALS Environmental - Waterloo	Air	unit conversion	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
F2-Naphthalene in Canisters by GC-MS (ug/m3)	EC593D ALS Environmental - Waterloo	Air	CCME PHC	F2-PAH = CCME Fraction 2 (C10-C16) minus Naphthalene
VOCs (TO-15 List) in Air by Canister or Bag by GC-MS (ug/m3)	EC621B ALS Environmental - Waterloo	Air	unit conversion	Convert ppbV to ug/m3
Air Canister Information	EF001 ALS Environmental - Waterloo	Air	In-house	Air canister information provided by client and recorded on ALS report may affect the validity of results.



QUALITY CONTROL REPORT

Work Order : **CG2502145**
Client : Tetra Tech Canada Inc.
Contact : Darby Madalena
Address : 110, 140 Quarry Park Blvd SE
 Calgary AB Canada T2C 3G3
Telephone : 403 203 3355
Project : SWM.SWOP04071-04.004
PO : SWM.SWOP04071-04.004
C-O-C number : CORD RDM VWs
Sampler : Willem Verdun
Site : ----
Quote number : CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill
 Sites
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 11
Laboratory : ALS Environmental - Calgary
Account Manager : Patryk Wojciak
Address : 2559 29th Street NE
 Calgary, Alberta Canada T1Y 7B5
Telephone : +1 403 407 1800
Date Samples Received : 26-Feb-2025 15:15
Date Analysis Commenced : 05-Mar-2025
Issue Date : 12-Mar-2025 15:25

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Andrea Armstrong	Department Manager - Air Quality and Volatiles	Waterloo Air Quality, Waterloo, Ontario

Page : 2 of 11
Work Order : CG2502145
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.004



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Air

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Permanent Gases (QC Lot: 1895649)											
CG2502145-001	25VW-04	Carbon dioxide	124-38-9	E629B-H	0.050	%	5.56	5.13	7.94%	20%	----
		Carbon monoxide	630-08-0	E629B-H	0.050	%	<0.050	<0.050	0	Diff <2x LOR	----
		Methane	74-82-8	E629B-H	0.050	%	0.648	0.615	5.14%	20%	----
		Nitrogen	7727-37-9	E629B-H	1.0	%	79.4	72.5	9.07%	20%	----
		Oxygen	7782-44-7	E629B-H	0.10	%	14.0	13.0	7.17%	20%	----
Volatile Organic Compounds (QC Lot: 1899960)											
CG2502145-001	25VW-04	Acetone	67-64-1	E621B	5.4	ppbv	<5.4	<5.4	0	Diff <2x LOR	----
		Allyl chloride	107-05-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Benzene	71-43-2	E621B	0.54	ppbv	9.02	9.12	1.14%	30%	----
		Benzyl chloride	100-44-7	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Bromoform	75-25-2	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Butadiene, 1,3-	106-99-0	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Carbon disulfide	75-15-0	E621B	2.70	ppbv	<2.70	<2.70	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Chloroform	67-66-3	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Chloromethane	74-87-3	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Cyclohexane	110-82-7	E621B	48.1	ppbv	730	736	0.712%	30%	----
		Dibromochloromethane	124-48-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E621B	1.08	ppbv	2.09	2.09	0.004	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E621B	4.98	ppbv	28.7	28.6	0.06	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E621B	1.08	ppbv	1.60	1.62	0.02	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----



Sub-Matrix: Air

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1899960) - continued											
CG2502145-001	25VW-04	Dichloroethylene, cis-1,2-	156-59-2	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E621B	1.08	ppbv	1.20	1.17	0.03	Diff <2x LOR	----
		Dichloromethane	75-09-2	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichloropropylene, cis+trans-1,3-	542-75-6	E621B	1.53	ppbv	<1.53	<1.53	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	1.08	ppbv	8.29	8.34	0.637%	30%	----
		Dioxane, 1,4-	123-91-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Ethyl acetate	141-78-6	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E621B	0.54	ppbv	11.6	11.7	0.987%	30%	----
		Ethyltoluene, 4-	622-96-8	E621B	1.08	ppbv	12.6	12.3	2.62%	30%	----
		Heptane, n-	142-82-5	E621B	48.1	ppbv	357	359	0.583%	30%	----
		Hexachlorobutadiene	87-68-3	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E621B	48.1	ppbv	338	341	0.922%	30%	----
		Hexanone, 2-	591-78-6	E621B	77.0	ppbv	<76.0	<77.0	1.0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E621B	1.08	ppbv	2.20	2.21	0.01	Diff <2x LOR	----
		Methyl ethyl ketone [MEK]	78-93-3	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Methyl isobutyl ketone [MIBK]	108-10-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Naphthalene	91-20-3	E621B	0.54	ppbv	1.19	0.96	0.23	Diff <2x LOR	----
		Propylene	115-07-1	E621B	13.2	ppbv	<13.4	13.2	0.15	Diff <2x LOR	----
		Styrene	100-42-5	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Tetrahydrofuran	109-99-9	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Toluene	108-88-3	E621B	0.54	ppbv	1.08	1.04	0.04	Diff <2x LOR	----
		Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,4-	120-82-1	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----



Sub-Matrix: Air					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1899960) - continued											
CG2502145-001	25VW-04	Trimethylbenzene, 1,2,4-	95-63-6	E621B	1.08	ppbv	20.7	20.8	0.0469%	30%	----
		Trimethylbenzene, 1,3,5-	108-67-8	E621B	4.98	ppbv	88.7	88.7	0.00487%	30%	----
		Trimethylpentane, 2,2,4-	540-84-1	E621B	4.98	ppbv	60.3	60.6	0.441%	30%	----
		Vinyl acetate	108-05-4	E621B	22.5	ppbv	<22.5	<22.5	0	Diff <2x LOR	----
		Vinyl bromide	593-60-2	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Vinyl chloride	75-01-4	E621B	1.08	ppbv	<1.08	<1.08	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E621B	4.98	ppbv	61.0	61.7	1.06%	30%	----
Xylene, o-	95-47-6	E621B	2.49	ppbv	52.6	52.7	0.252%	30%	----		
Hydrocarbons (QC Lot: 1899961)											
CG2502145-001	25VW-04	F1 (C6-C10)	----	E593A	75	µg/m³	44600	44200	0.810%	30%	----
		F2 (C10-C16)	----	E593A	75	µg/m³	10700	10700	0.277%	30%	----
Hydrocarbons (QC Lot: 1899962)											
CG2502145-001	25VW-04	Aromatic (C10-C12)	----	E593C	75	µg/m³	1090	1090	0.118%	50%	----
		Aromatic (C12-C16)	----	E593C	149	µg/m³	<149	<149	0	Diff <2x LOR	----
		Aromatic (C6-C8)	----	E593C	75	µg/m³	137	134	3	Diff <2x LOR	----
		Aromatic (C8-C10)	----	E593C	75	µg/m³	1760	1750	0.633%	50%	----
		TVOC (C10-C12)	----	E593C	75	µg/m³	8120	8060	0.654%	50%	----
		TVOC (C12-C16)	----	E593C	149	µg/m³	202	237	36	Diff <2x LOR	----
		TVOC (C6-C8)	----	E593C	75	µg/m³	24900	24800	0.638%	50%	----
TVOC (C8-C10)	----	E593C	75	µg/m³	26000	25700	0.923%	50%	----		



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Field Tests (QCLot: 1896736)						
Pressure on receipt	---	EF001	0.1	Inches Hg	-30.0	---
Permanent Gases (QCLot: 1895649)						
Carbon dioxide	124-38-9	E629B-H	0.05	%	<0.050	---
Carbon monoxide	630-08-0	E629B-H	0.05	%	<0.050	---
Methane	74-82-8	E629B-H	0.05	%	<0.050	---
Nitrogen	7727-37-9	E629B-H	1	%	<1.0	---
Oxygen	7782-44-7	E629B-H	0.1	%	<0.10	---
Volatile Organic Compounds (QCLot: 1899960)						
Acetone	67-64-1	E621B	1	ppbv	<1.0	---
Allyl chloride	107-05-1	E621B	0.2	ppbv	<0.20	---
Benzene	71-43-2	E621B	0.1	ppbv	<0.10	---
Benzyl chloride	100-44-7	E621B	0.2	ppbv	<0.20	---
Bromodichloromethane	75-27-4	E621B	0.2	ppbv	<0.20	---
Bromoform	75-25-2	E621B	0.2	ppbv	<0.20	---
Bromomethane	74-83-9	E621B	0.2	ppbv	<0.20	---
Butadiene, 1,3-	106-99-0	E621B	0.2	ppbv	<0.20	---
Carbon disulfide	75-15-0	E621B	0.5	ppbv	<0.50	---
Carbon tetrachloride	56-23-5	E621B	0.2	ppbv	<0.20	---
Chlorobenzene	108-90-7	E621B	0.2	ppbv	<0.20	---
Chloroethane	75-00-3	E621B	0.2	ppbv	<0.20	---
Chloroform	67-66-3	E621B	0.2	ppbv	<0.20	---
Chloromethane	74-87-3	E621B	0.2	ppbv	<0.20	---
Cyclohexane	110-82-7	E621B	0.2	ppbv	<0.20	---
Dibromochloromethane	124-48-1	E621B	0.2	ppbv	<0.20	---
Dibromoethane, 1,2-	106-93-4	E621B	0.2	ppbv	<0.20	---
Dichlorobenzene, 1,2-	95-50-1	E621B	0.2	ppbv	<0.20	---
Dichlorobenzene, 1,3-	541-73-1	E621B	0.2	ppbv	<0.20	---
Dichlorobenzene, 1,4-	106-46-7	E621B	0.2	ppbv	<0.20	---
Dichlorodifluoromethane	75-71-8	E621B	0.2	ppbv	<0.20	---
Dichloroethane, 1,1-	75-34-3	E621B	0.2	ppbv	<0.20	---
Dichloroethane, 1,2-	107-06-2	E621B	0.2	ppbv	<0.20	---
Dichloroethylene, 1,1-	75-35-4	E621B	0.2	ppbv	<0.20	---



Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1899960) - continued						
Dichloroethylene, cis-1,2-	156-59-2	E621B	0.2	ppbv	<0.20	----
Dichloroethylene, trans-1,2-	156-60-5	E621B	0.2	ppbv	<0.20	----
Dichloromethane	75-09-2	E621B	0.2	ppbv	<0.20	----
Dichloropropane, 1,2-	78-87-5	E621B	0.2	ppbv	<0.20	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.2	ppbv	<0.20	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.2	ppbv	<0.20	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.2	ppbv	<0.20	----
Dioxane, 1,4-	123-91-1	E621B	0.2	ppbv	<0.20	----
Ethyl acetate	141-78-6	E621B	0.2	ppbv	<0.20	----
Ethylbenzene	100-41-4	E621B	0.1	ppbv	<0.10	----
Ethyltoluene, 4-	622-96-8	E621B	0.2	ppbv	<0.20	----
Heptane, n-	142-82-5	E621B	0.2	ppbv	<0.20	----
Hexachlorobutadiene	87-68-3	E621B	0.2	ppbv	<0.20	----
Hexane, n-	110-54-3	E621B	0.2	ppbv	<0.20	----
Hexanone, 2-	591-78-6	E621B	1	ppbv	<1.0	----
Isopropylbenzene	98-82-8	E621B	0.2	ppbv	<0.20	----
Methyl ethyl ketone [MEK]	78-93-3	E621B	0.2	ppbv	<0.20	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.2	ppbv	<0.20	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.2	ppbv	<0.20	----
Naphthalene	91-20-3	E621B	0.1	ppbv	<0.10	----
Propylene	115-07-1	E621B	0.2	ppbv	<0.20	----
Styrene	100-42-5	E621B	0.2	ppbv	<0.20	----
Tetrachloroethane, 1,1,1,2,2-	79-34-5	E621B	0.2	ppbv	<0.20	----
Tetrachloroethylene	127-18-4	E621B	0.2	ppbv	<0.20	----
Tetrahydrofuran	109-99-9	E621B	0.2	ppbv	<0.20	----
Toluene	108-88-3	E621B	0.1	ppbv	<0.10	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.2	ppbv	<0.20	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.2	ppbv	<0.20	----
Trichloroethane, 1,1,1-	71-55-6	E621B	0.2	ppbv	<0.20	----
Trichloroethane, 1,1,2-	79-00-5	E621B	0.2	ppbv	<0.20	----
Trichloroethylene	79-01-6	E621B	0.2	ppbv	<0.20	----
Trichlorofluoromethane	75-69-4	E621B	0.2	ppbv	<0.20	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.2	ppbv	<0.20	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.2	ppbv	<0.20	----
Trimethylpentane, 2,2,4-	540-84-1	E621B	0.2	ppbv	<0.20	----



Sub-Matrix: Air

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1899960) - continued						
Vinyl acetate	108-05-4	E621B	0.5	ppbv	<0.50	----
Vinyl bromide	593-60-2	E621B	0.2	ppbv	<0.20	----
Vinyl chloride	75-01-4	E621B	0.2	ppbv	<0.20	----
Xylene, m+p-	179601-23-1	E621B	0.2	ppbv	<0.20	----
Xylene, o-	95-47-6	E621B	0.1	ppbv	<0.10	----
Hydrocarbons (QCLot: 1899961)						
F1 (C6-C10)	----	E593A	15	µg/m ³	<15	----
F2 (C10-C16)	----	E593A	15	µg/m ³	# 19	----
Hydrocarbons (QCLot: 1899962)						
Aromatic (C10-C12)	----	E593C	15	µg/m ³	<15	----
Aromatic (C12-C16)	----	E593C	30	µg/m ³	<30	----
Aromatic (C6-C8)	----	E593C	15	µg/m ³	<15	----
Aromatic (C8-C10)	----	E593C	15	µg/m ³	<15	----
TVOC (C10-C12)	----	E593C	15	µg/m ³	<15	----
TVOC (C12-C16)	----	E593C	30	µg/m ³	<30	----
TVOC (C6-C8)	----	E593C	15	µg/m ³	<15	----
TVOC (C8-C10)	----	E593C	15	µg/m ³	<15	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Permanent Gases (QCLot: 1895649)									
Carbon dioxide	124-38-9	E629B-H	0.05	%	4.98 %	98.9	70.0	130	----
Carbon monoxide	630-08-0	E629B-H	0.05	%	0.747 %	107	70.0	130	----
Methane	74-82-8	E629B-H	0.05	%	15 %	96.6	70.0	130	----
Nitrogen	7727-37-9	E629B-H	1	%	50.4 %	98.2	70.0	130	----
Oxygen	7782-44-7	E629B-H	0.1	%	7.41 %	105	70.0	130	----
Volatile Organic Compounds (QCLot: 1899960)									
Acetone	67-64-1	E621B	1	ppbv	1.06 ppbv	100	70.0	130	----
Allyl chloride	107-05-1	E621B	0.2	ppbv	1.02 ppbv	92.4	70.0	130	----
Benzene	71-43-2	E621B	0.1	ppbv	1.04 ppbv	99.6	70.0	130	----
Benzyl chloride	100-44-7	E621B	0.2	ppbv	1.05 ppbv	79.2	70.0	130	----
Bromodichloromethane	75-27-4	E621B	0.2	ppbv	1.07 ppbv	96.4	70.0	130	----
Bromoform	75-25-2	E621B	0.2	ppbv	1.04 ppbv	96.0	70.0	130	----
Bromomethane	74-83-9	E621B	0.2	ppbv	1.01 ppbv	97.7	70.0	130	----
Butadiene, 1,3-	106-99-0	E621B	0.2	ppbv	1.05 ppbv	92.1	70.0	130	----
Carbon disulfide	75-15-0	E621B	0.5	ppbv	1.05 ppbv	88.7	70.0	130	----
Carbon tetrachloride	56-23-5	E621B	0.2	ppbv	1.07 ppbv	98.9	70.0	130	----
Chlorobenzene	108-90-7	E621B	0.2	ppbv	1.05 ppbv	95.5	70.0	130	----
Chloroethane	75-00-3	E621B	0.2	ppbv	1 ppbv	99.4	70.0	130	----
Chloroform	67-66-3	E621B	0.2	ppbv	1.02 ppbv	102	70.0	130	----
Chloromethane	74-87-3	E621B	0.2	ppbv	0.99 ppbv	107	70.0	130	----
Cyclohexane	110-82-7	E621B	0.2	ppbv	1.06 ppbv	98.9	70.0	130	----
Dibromochloromethane	124-48-1	E621B	0.2	ppbv	1.06 ppbv	98.4	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E621B	0.2	ppbv	1.05 ppbv	96.9	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E621B	0.2	ppbv	1.05 ppbv	72.0	70.0	130	----
Dichlorobenzene, 1,3-	541-73-1	E621B	0.2	ppbv	1.05 ppbv	77.3	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E621B	0.2	ppbv	1.04 ppbv	74.6	70.0	130	----
Dichlorodifluoromethane	75-71-8	E621B	0.2	ppbv	1.01 ppbv	99.1	70.0	130	----
Dichloroethane, 1,1-	75-34-3	E621B	0.2	ppbv	1.03 ppbv	101	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E621B	0.2	ppbv	1.08 ppbv	95.6	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E621B	0.2	ppbv	1.04 ppbv	90.7	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E621B	0.2	ppbv	1.04 ppbv	100	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E621B	0.2	ppbv	1.04 ppbv	98.7	70.0	130	----



Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1899960) - continued									
Dichloromethane	75-09-2	E621B	0.2	ppbv	1.03 ppbv	95.7	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E621B	0.2	ppbv	1.02 ppbv	102	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E621B	0.2	ppbv	1.02 ppbv	97.8	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E621B	0.2	ppbv	1.04 ppbv	89.7	70.0	130	----
Dichlorotetrafluoroethane, 1,2- [Freon 114]	76-14-2	E621B	0.2	ppbv	0.96 ppbv	102	70.0	130	----
Dioxane, 1,4-	123-91-1	E621B	0.2	ppbv	1.04 ppbv	93.9	70.0	130	----
Ethyl acetate	141-78-6	E621B	0.2	ppbv	1.02 ppbv	104	70.0	130	----
Ethylbenzene	100-41-4	E621B	0.1	ppbv	1.06 ppbv	92.2	70.0	130	----
Ethyltoluene, 4-	622-96-8	E621B	0.2	ppbv	1.04 ppbv	80.7	70.0	130	----
Heptane, n-	142-82-5	E621B	0.2	ppbv	1.04 ppbv	99.1	70.0	130	----
Hexachlorobutadiene	87-68-3	E621B	0.2	ppbv	1.09 ppbv	86.1	70.0	130	----
Hexane, n-	110-54-3	E621B	0.2	ppbv	1.05 ppbv	97.8	70.0	130	----
Hexanone, 2-	591-78-6	E621B	1	ppbv	1.04 ppbv	93.0	70.0	130	----
Isopropylbenzene	98-82-8	E621B	0.2	ppbv	1.02 ppbv	95.7	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E621B	0.2	ppbv	1.04 ppbv	97.5	70.0	130	----
Methyl isobutyl ketone [MIBK]	108-10-1	E621B	0.2	ppbv	1.02 ppbv	90.2	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E621B	0.2	ppbv	1.04 ppbv	98.1	70.0	130	----
Naphthalene	91-20-3	E621B	0.1	ppbv	1.13 ppbv	75.6	70.0	130	----
Propylene	115-07-1	E621B	0.2	ppbv	1.07 ppbv	93.5	70.0	130	----
Styrene	100-42-5	E621B	0.2	ppbv	1.04 ppbv	90.4	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E621B	0.2	ppbv	1.05 ppbv	89.1	70.0	130	----
Tetrachloroethylene	127-18-4	E621B	0.2	ppbv	1.04 ppbv	97.0	70.0	130	----
Tetrahydrofuran	109-99-9	E621B	0.2	ppbv	0.98 ppbv	104	70.0	130	----
Toluene	108-88-3	E621B	0.1	ppbv	1.05 ppbv	96.4	70.0	130	----
Trichloro-1,2,2-trifluoroethane, 1,1,2- [Freon 113]	76-13-1	E621B	0.2	ppbv	1.02 ppbv	97.3	70.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E621B	0.2	ppbv	1.08 ppbv	87.6	70.0	130	----
Trichloroethane, 1,1,1-	71-55-6	E621B	0.2	ppbv	1.04 ppbv	104	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E621B	0.2	ppbv	1.05 ppbv	96.6	70.0	130	----
Trichloroethylene	79-01-6	E621B	0.2	ppbv	1.05 ppbv	92.9	70.0	130	----
Trichlorofluoromethane	75-69-4	E621B	0.2	ppbv	1.04 ppbv	99.5	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E621B	0.2	ppbv	1.05 ppbv	78.3	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E621B	0.2	ppbv	1.05 ppbv	79.8	70.0	130	----
Trimethylpentane, 2,2,4-	540-84-1	E621B	0.2	ppbv	1.05 ppbv	98.8	70.0	130	----
Vinyl acetate	108-05-4	E621B	0.5	ppbv	1.07 ppbv	92.2	70.0	130	----
Vinyl bromide	593-60-2	E621B	0.2	ppbv	1.02 ppbv	91.0	70.0	130	----
Vinyl chloride	75-01-4	E621B	0.2	ppbv	1.01 ppbv	101	70.0	130	----



Sub-Matrix: Air

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1899960) - continued									
Xylene, m+p-	179601-23-1	E621B	0.2	ppbv	2.08 ppbv	94.4	70.0	130	----
Xylene, o-	95-47-6	E621B	0.1	ppbv	1.05 ppbv	92.0	70.0	130	----
Hydrocarbons (QCLot: 1899961)									
F1 (C6-C10)	----	E593A	15	µg/m ³	815 µg/m ³	83.4	50.0	150	----
Hydrocarbons (QCLot: 1899962)									
Aromatic (C10-C12)	----	E593C	15	µg/m ³	60.8 µg/m ³	95.2	50.0	150	----
Aromatic (C12-C16)	----	E593C	30	µg/m ³	60.1 µg/m ³	# 161	50.0	150	LCS-H
Aromatic (C6-C8)	----	E593C	15	µg/m ³	60.1 µg/m ³	103	50.0	150	----
Aromatic (C8-C10)	----	E593C	15	µg/m ³	59.6 µg/m ³	102	50.0	150	----
TVOC (C10-C12)	----	E593C	15	µg/m ³	121 µg/m ³	98.3	50.0	150	----
TVOC (C12-C16)	----	E593C	30	µg/m ³	120 µg/m ³	127	50.0	150	----
TVOC (C6-C8)	----	E593C	15	µg/m ³	120 µg/m ³	109	50.0	150	----
TVOC (C8-C10)	----	E593C	15	µg/m ³	119 µg/m ³	104	50.0	150	----

Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.

Batch Proof Report



right solutions.
right partner.

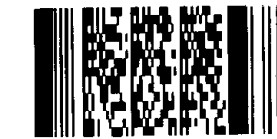
Batch Proof ID: 250108.112
Canister ID: 01400-0391
Analysis Date: 11-Feb-25

1,1,1-Trichloroethane	<0.02	ppb(V)	cis-1,3-Dichloropropene	<0.02	ppb(V)
1,1,1,2-Tetrachloroethane	<0.02	ppb(V)	Cyclohexane	<0.20	ppb(V)
1,1,2,2-Tetrachloroethane	<0.02	ppb(V)	Dibromochloromethane	<0.20	ppb(V)
1,1,2-Trichloroethane	<0.02	ppb(V)	Dichlorodifluoromethane	<0.20	ppb(V)
1,1-Dichloroethane	<0.02	ppb(V)	Ethyl Acetate	<0.20	ppb(V)
1,1-Dichloroethene	<0.02	ppb(V)	Ethyl Benzene	<0.02	ppb(V)
1,2,4-Trichlorobenzene	<0.20	ppb(V)	Freon 113	<0.20	ppb(V)
1,2,4-Trimethylbenzene	<0.20	ppb(V)	Freon 114	<0.20	ppb(V)
1,2-Dibromoethane	<0.01	ppb(V)	Hexachlorobutadiene	<0.02	ppb(V)
1,2-Dichlorobenzene	<0.02	ppb(V)	Isooctane	<0.20	ppb(V)
1,2-Dichloroethane	<0.01	ppb(V)	Isopropyl Alcohol	<0.20	ppb(V)
1,2-Dichloropropane	<0.02	ppb(V)	Isopropylbenzene	<0.20	ppb(V)
1,3,5-Trimethylbenzene	<0.20	ppb(V)	m&p-Xylene	<0.04	ppb(V)
1,3-Butadiene	<0.20	ppb(V)	Methyl Ethyl Ketone	<0.20	ppb(V)
1,3-Dichlorobenzene	<0.02	ppb(V)	Methylcyclohexane	<0.20	ppb(V)
1,4-Dichlorobenzene	<0.02	ppb(V)	Methyl Isobutyl Ketone	<0.20	ppb(V)
1,4-Dioxane	<0.20	ppb(V)	Methylene Chloride	<0.02	ppb(V)
2-Chlorophenol	<0.20	ppb(V)	MTBE	<0.20	ppb(V)
2-Hexanone	<1.0	ppb(V)	Naphthalene	<0.05	ppb(V)
4-Ethyltoluene	<0.20	ppb(V)	n-Decane	<0.20	ppb(V)
Acetone	<1.0	ppb(V)	n-Heptane	<0.20	ppb(V)
Acrolein	<0.10	ppb(V)	n-Hexane	<0.02	ppb(V)
Allyl Chloride	<0.20	ppb(V)	o-Xylene	<0.02	ppb(V)
Benzene	<0.02	ppb(V)	Propylene	<0.20	ppb(V)
Benzyl Chloride	<0.20	ppb(V)	Styrene	<0.02	ppb(V)
Bromodichloromethane	<0.20	ppb(V)	Tetrachloroethylene	<0.02	ppb(V)
Bromobenzene	<0.20	ppb(V)	Tetrahydrofuran	<0.20	ppb(V)
Bromoform	<0.02	ppb(V)	Toluene	<0.02	ppb(V)
Bromomethane	<0.20	ppb(V)	trans-1,2-Dichloroethene	<0.02	ppb(V)
Carbon Disulfide	<0.50	ppb(V)	trans-1,3-Dichloropropene	<0.02	ppb(V)
Carbon Tetrachloride	<0.02	ppb(V)	Trichloroethylene	<0.02	ppb(V)
Chlorobenzene	<0.20	ppb(V)	Trichlorofluoromethane	<0.20	ppb(V)
Chloroethane	<0.02	ppb(V)	Vinyl Acetate	<0.50	ppb(V)
Chloroform	<0.02	ppb(V)	Vinyl Bromide	<0.20	ppb(V)
Chloromethane	<0.20	ppb(V)	Vinyl Chloride	<0.02	ppb(V)
cis-1,2-Dichloroethene	<0.02	ppb(V)	4-Bromofluorobenzene	111.45	%



Report to:			Report Format / Distribution			Service Requested:																																							
Company: Tetra Tech Canada Inc.			<input type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="checkbox"/> Regular Service (Default)																																							
Contact: Darby Madalena			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax			<input type="checkbox"/> Rush Service (2-3 Days)																																							
Address: 110, 140 Quarry Park Blvd SE, Calgary, AB T2C 3G3			Email 1: darby.madalena@tetratech.com			<input type="checkbox"/> Priority Service (1 Day or ASAP)																																							
			Email 2: jaymes.going@tetratech.com			<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS																																							
Phone: 403-723-6867 Fax: 403-203-3301			ALS Digital Crosstab results			Analysis Request																																							
Invoice To: <input checked="" type="checkbox"/> Same as Report			Indicate Bottles: Filtered / Preserved (F/P) →→																																										
Company: SAME AS REPORT			Client / Project Information:			<table border="1" style="width: 100%; text-align: center;"> <tr> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">EP592</td> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">S621E - Aliphatic and Aromatic</td> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">S629B - Methane, CO2, CO, N</td> <td colspan="6"></td> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</td> </tr> <tr> <td colspan="6">Job #: SWM.SWOP04071-04.004</td> </tr> <tr> <td colspan="6">PO/AFE: SWM.SWOP04071-04.004</td> </tr> <tr> <td colspan="6">Legal Site Description:</td> </tr> <tr> <td colspan="6">Quote #: CG22-EBAE100-0021</td> </tr> </table>						EP592	S621E - Aliphatic and Aromatic	S629B - Methane, CO2, CO, N							Number of Containers	Job #: SWM.SWOP04071-04.004						PO/AFE: SWM.SWOP04071-04.004						Legal Site Description:						Quote #: CG22-EBAE100-0021					
EP592	S621E - Aliphatic and Aromatic	S629B - Methane, CO2, CO, N													Number of Containers																														
			Job #: SWM.SWOP04071-04.004																																										
			PO/AFE: SWM.SWOP04071-04.004																																										
			Legal Site Description:																																										
			Quote #: CG22-EBAE100-0021																																										
Contact:			Job #:																																										
Address:			PO/AFE:																																										
Sample:			Legal Site Description:																																										
Phone:			Quote #:																																										
Lab Work Order # (lab use only)			ALS Contact: Patryk Wojciak		Sampler (Initials): <i>Willem Verdug</i>																																								
Sample #	Sample Identification (This description will appear on the report)			Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	EP592		S621E - Aliphatic and Aromatic		S629B - Methane, CO2, CO, N		Number of Containers																																
	25VVW-04			26-Feb-25	11:32	Air	X	X	X																																				
	Duplicate			26-Feb		Air	X	X	X																																				
Guidelines / Regulations						Special Instructions / Hazardous Details																																							
						QUOTE CG2022EBAE1000021																																							
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																																													
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.																																													
Relinquished By:	<i>Willem Verdug</i>	Date & Time:	<i>Feb 26, 2025 08:00</i>	Received By:		Date & Time:		Sample Condition (lab use only)																																					
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature	Samples Received in Good Condition? Y / N (if no provided details)																																				

Environmental Division
Calgary
Work Order Reference
CG2502145



Telephone: +1 403 407 1800

21.3, FG 26-02-25 3:15

AIR SAMPLING MEDIA REQUEST FORM



COMPLETE Blue sections. Grey sections are for INTERNAL USE ONLY
Form MUST be reviewed & initialed by an ALS Account Manager prior to submission to NAWTR AIRMEDIA REQUEST (nawtr.airmediarequest@alsglobal.com)

SHIPPING INFO: **pls ship Purolator Express Wed 19FEB for delivery 21FEB latest**

CLIENT:	Tetra Tech	ORDER TAKEN BY:	PAT W
CLIENT CONTACT:	Willem Verduyn	ORDER DATE:	12-Feb-24
CLIENT PROJECT/PO:	SWM SWOP04071-04	AM REVIEWER:	DSTASTNY
QUOTE #: (mandatory)	GG2022EBAE1000021	CLIENT EXPECT DATE:	21-Feb-24
DELIVERY TO:	110, 140 Quarry Park Blvd SE, Calgary AB T2C 3G3	ORDER FILLED BY:	YB
TELEPHONE NUMBER:	403-203-3355	PEER REVIEWER:	
SHIP TO (include email):	Willem.Verduyn@tetratech.com	DATE COMPLETED:	FEB-14-2025

Shipping Method: Regular (ALS will cover shipping cost)
(Select one) RUSH (Client will be billed for shipping costs, please confirm with Account Manager)
 External Courier
 Pickup at ALS
 Location:
 ALS Drivers

Shipping Company: FedEx
 Purolator
 DHL
 UPS
 Other
 N/A

Tracking Number:

Completion of all Sections is Mandatory

1. What type of air is being sampled? **Check all appropriate types in the Additional Information Box below**
 2. Please provide a list of compounds and reporting limits that are required. **Include regulation & target list (attach to email)**
 3. What is your planned canister sampling time? **Options listed under Regulator Times**
 4. Trip blanks will be shipped pre-filled unless specifically requested below.
- Note: If analysis required is DIFFERENT than what is LISTED on this form, email nawtr.airmediarequest@alsglobal.com ASAP to confirm the media was adequately proofed.**

Canister Size/Tube	Regulator Times	Regulator Quantity	Parameters/ Product Codes	Canister/Tube Identification #	Initial Pressure/Flow (mmHg/mL per min)	Controller Identification #
6L Canister	24 hr					
	12 hr					
	8 hr					
	4 hr					
	1 hr					
	0.5 hr					
Number of Canisters	Trip Blank					
1.4L Canister	60 mins	2	S621E (TO15/F1/F1/Aliphatic/Aromatic) and S629B (Permanent Gases Methane, CO2, CO, N2, O2)	01400-0524	28.7	G382
	20 mins			01400-0565	28.7	G347
	10 mins					
	4 mins					
	No Restrictor					
Number of Canisters	2					DUP SAMPLER DS3
Bottle Vacs	40 mins					
	14 mins					
	7 mins					
	3 mins					
	No Restrictor					
Number of Canisters	Trip Blank					
Passive CarboPak X Tubes						
Diffusive Caps						
Active SVI Tubes						
Calibration Tube for SVI (yes/no)						
Other Sampling Supplies		Quantity	ID #	Additional Information & Special Instructions or Requests		
Pressure Gauge	1	PG89	Check all that apply:			
Caplok Tool			<input type="checkbox"/> Indoor Air	<input type="checkbox"/> Sub-Slab	<input type="checkbox"/> Industrial	
Canister Stands			<input type="checkbox"/> Ambient Air	<input type="checkbox"/> Landfill	<input type="checkbox"/> Commercial	
Valve Adaptor for Soil Vapour			<input type="checkbox"/> Probe/Well	<input type="checkbox"/> Crawlspace	<input type="checkbox"/> Residential	
			<input checked="" type="checkbox"/> Other (specify):			
Chargeable Supplies		Quantity	COMMENTS:			
Duplicate Sampler - \$45 canister	1		1 sample 1 + 1 Duplicate. We use the 1.4 L summa canisters and 60 minute flow regulators. We will need the Teflon tubing for each sample and then a Y splitter for the duplicate.			
Valve Adaptor for Soil Vapour \$5						
Teflon Tubing - \$3 per foot	-Total length (ft)	3				
	-Length per section (ft)	3				
Nut & Ferrule Sets - \$8 per set	2					
Tedar Bags (contact the lab before SUBMITTING)	-\$28 unpurged					
	-\$45 purged					
Siloxane Kit - \$100 each (Kit: \$50, TD tube prep/rental: \$50)						
Rush Order Prep Charge (<48 hour notice, not including shipping)						
Include sampling supplies from other ALS location (yes/no)						
SEE COMMENTS						
RENTAL COSTS: Canister Rental is 2 WEEKS only. After this time additional rental fees apply.						
MEDIA REPLACEMENT COSTS: (Media lost or damaged will be charged to the client)						
1) TD SORBENT TUBE & CAPS - \$190.00 2) TD DIFFUSION CAP - \$30.00 3) CAPLOK TOOL SET - \$95.00 4) VACUUM GAUGE - \$240.00 5) BOTTLEVAC CANISTER - \$135.00 6) PROTECTIVE CAP - \$35.00 7) CANISTER - 6L: \$650.00; 1.4L: \$450.00 8) CONTROLLER - TWA: \$1000.00 GRAB: \$850.00 9) CANISTER STAND - \$75.00 10) DUPLICATE SAMPLER - \$550.00						



CERTIFICATE OF ANALYSIS

Work Order : **CG2412792**
Client : **Tetra Tech Canada Inc.**
Contact : Darby Madalena
Address : 110, 140 Quarry Park Blvd SE
 Calgary AB Canada T2C 3G3
Telephone : 403 203 3355
Project : SWM.SWOP04071-04.004
PO : SWM.SWOP04071-04.004
C-O-C number : CORD RED DEER MOTORS
Sampler : WILLEM VERDUYN
Site :
Quote number : CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972
 Landfill Sites
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 8
Laboratory : ALS Environmental - Calgary
Account Manager : Patryk Wojciak
Address : 2559 29th Street NE
 Calgary AB Canada T1Y 7B5
Telephone : +1 403 407 1800
Date Samples Received : 06-Sep-2024 15:00
Date Analysis Commenced : 07-Sep-2024
Issue Date : 12-Sep-2024 10:05

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Gurvinder Kour	Lab Assistant	Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Katarzyna Glinka	Analyst	Inorganics, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Organics, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Metals, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Inorganics, Calgary, Alberta



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	no units
%	percent
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

CG2412792-002 dissolved mercury vial received empty - parameter could not be run.

Sample Comments

<i>Sample</i>	<i>Client Id</i>	<i>Comment</i>
CG2412792-002	MW-04A	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
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Page : 3 of 8
Work Order : CG2412792
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.004



DLDS *Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*



Analytical Results

Sub-Matrix: Water					Client sample ID	MW-01	MW-04A	MW-05	DUPLICATE	----
(Matrix: Water)					Client sampling date / time	06-Sep-2024 07:15	06-Sep-2024 07:45	06-Sep-2024 08:00	06-Sep-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412792-001	CG2412792-002	CG2412792-003	CG2412792-004	-----	
					Result	Result	Result	Result	----	
Physical Tests										
Alkalinity, bicarbonate (as HCO3)	71-52-3	E290/CG	1.0	mg/L	850	928	1260	795	----	
Alkalinity, carbonate (as CO3)	3812-32-6	E290/CG	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----	
Alkalinity, hydroxide (as OH)	14280-30-9	E290/CG	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----	
Alkalinity, total (as CaCO3)	----	E290/CG	1.0	mg/L	697	761	1030	652	----	
Conductivity	----	E100/CG	1.0	µS/cm	2530	2650	2460	2530	----	
Hardness (as CaCO3), dissolved	----	EC100/CG	0.50	mg/L	788	929	973	801	----	
pH	----	E108/CG	0.10	pH units	7.27	7.81	7.08	7.18	----	
Solids, total dissolved [TDS], calculated	----	EC103/CG	1.0	mg/L	1470	1740	1520	1460	----	
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/CG	0.50	mg/L	460	315	207	463	----	
Fluoride	16984-48-8	E235.F/CG	0.020	mg/L	0.176	0.239	0.120	0.181	----	
Nitrate (as N)	14797-55-8	E235.NO3/CG	0.020	mg/L	<0.100 ^{DLDS}	0.202	<0.100 ^{DLDS}	<0.100 ^{DLDS}	----	
Nitrate + Nitrite (as N)	----	EC235.N+N/C G	0.0032	mg/L	<0.112	0.202	<0.112	<0.112	----	
Nitrite (as N)	14797-65-0	E235.NO2/CG	0.010	mg/L	<0.050 ^{DLDS}	<0.050 ^{DLDS}	<0.050 ^{DLDS}	<0.050 ^{DLDS}	----	
Sulfate (as SO4)	14808-79-8	E235.SO4/CG	0.30	mg/L	52.2	372	153	53.4	----	
Ion Balance										
Anion sum	----	EC101/CG	0.10	meq/L	28.0	31.9	29.6	27.2	----	
Cation sum	----	EC101/CG	0.10	meq/L	26.2	30.4	28.0	26.6	----	
Ion balance (APHA)	----	EC101/CG	0.01	%	-3.32	-2.41	-2.78	-1.12	----	
Ion balance (cations/anions)	----	EC101/CG	0.010	%	93.6	95.3	94.6	97.8	----	
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/CG	0.0010	mg/L	<0.0020 ^{DLDS}	0.0037	0.0641	<0.0020 ^{DLDS}	----	
Antimony, dissolved	7440-36-0	E421/CG	0.00010	mg/L	<0.00020 ^{DLDS}	0.00952	0.00023	<0.00020 ^{DLDS}	----	
Arsenic, dissolved	7440-38-2	E421/CG	0.00010	mg/L	0.0228	0.00425	0.00864	0.0232	----	
Barium, dissolved	7440-39-3	E421/CG	0.00010	mg/L	0.616	0.0531	0.796	0.600	----	
Boron, dissolved	7440-42-8	E421/CG	0.010	mg/L	0.073	0.139	0.175	0.075	----	
Cadmium, dissolved	7440-43-9	E421/CG	0.0000050	mg/L	<0.0000100 ^{DLDS}	0.00194	0.0000706	<0.0000100 ^{DLDS}	----	
Calcium, dissolved	7440-70-2	E421/CG	0.050	mg/L	153	199	182	158	----	



Analytical Results

Sub-Matrix: Water					Client sample ID	MW-01	MW-04A	MW-05	DUPLICATE	----
(Matrix: Water)					Client sampling date / time	06-Sep-2024 07:15	06-Sep-2024 07:45	06-Sep-2024 08:00	06-Sep-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412792-001	CG2412792-002	CG2412792-003	CG2412792-004	-----	----
					Result	Result	Result	Result	----	
Dissolved Metals										
Chromium, dissolved	7440-47-3	E421/CG	0.00050	mg/L	<0.00100 ^{DLDS}	<0.00100 ^{DLDS}	<0.00100 ^{DLDS}	<0.00100 ^{DLDS}	----	----
Copper, dissolved	7440-50-8	E421/CG	0.00020	mg/L	<0.00040 ^{DLDS}	0.154	0.00250	<0.00040 ^{DLDS}	----	----
Iron, dissolved	7439-89-6	E421/CG	0.010	mg/L	25.3	<0.020 ^{DLDS}	6.93	25.4	----	----
Lead, dissolved	7439-92-1	E421/CG	0.000050	mg/L	<0.000100 ^{DLDS}	0.000540	0.000348	<0.000100 ^{DLDS}	----	----
Magnesium, dissolved	7439-95-4	E421/CG	0.0050	mg/L	98.5	105	126	98.8	----	----
Manganese, dissolved	7439-96-5	E421/CG	0.00010	mg/L	1.86	0.481	1.91	1.94	----	----
Mercury, dissolved	7439-97-6	E509/CG	0.0000050	mg/L	<0.0000050	----	<0.0000050	<0.0000050	----	----
Nickel, dissolved	7440-02-0	E421/CG	0.00050	mg/L	0.0137	0.0508	0.0268	0.0138	----	----
Potassium, dissolved	7440-09-7	E421/CG	0.050	mg/L	7.71	5.94	10.4	7.82	----	----
Selenium, dissolved	7782-49-2	E421/CG	0.000050	mg/L	0.000116	0.00298	0.000193	0.000106	----	----
Silver, dissolved	7440-22-4	E421/CG	0.000010	mg/L	<0.000020 ^{DLDS}	<0.000020 ^{DLDS}	<0.000020 ^{DLDS}	<0.000020 ^{DLDS}	----	----
Sodium, dissolved	7440-23-5	E421/CG	0.050	mg/L	214	269	183	217	----	----
Uranium, dissolved	7440-61-1	E421/CG	0.000010	mg/L	0.00287	0.0918	0.0122	0.00279	----	----
Zinc, dissolved	7440-66-6	E421/CG	0.0010	mg/L	<0.0020 ^{DLDS}	0.0386	0.0056	0.0027	----	----
Dissolved mercury filtration location	----	EP509/CG	-	-	Field	Laboratory	Field	Field	----	----
Dissolved metals filtration location	----	EP421/CG	-	-	Field	Laboratory	Field	Field	----	----
Volatile Organic Compounds										
Benzene	71-43-2	E611A/CG	0.50	µg/L	2.42	<0.50	1.84	2.21	----	----
Bromobenzene	108-86-1	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Bromochloromethane	74-97-5	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Bromodichloromethane	75-27-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Bromoform	75-25-2	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Bromomethane	74-83-9	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Butylbenzene, n-	104-51-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Butylbenzene, sec-	135-98-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Butylbenzene, tert-	98-06-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Carbon tetrachloride	56-23-5	E611E/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----	----
Chlorobenzene	108-90-7	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Chloroethane	75-00-3	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----
Chloroform	67-66-3	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	----



Analytical Results

Sub-Matrix: Water					Client sample ID	MW-01	MW-04A	MW-05	DUPLICATE	----
(Matrix: Water)					Client sampling date / time	06-Sep-2024 07:15	06-Sep-2024 07:45	06-Sep-2024 08:00	06-Sep-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412792-001	CG2412792-002	CG2412792-003	CG2412792-004	-----	
					Result	Result	Result	Result	----	
Volatile Organic Compounds										
Chloromethane	74-87-3	E611E/CG	5.0	µg/L	<5.0	<5.0	<5.0	<5.0	----	
Chlorotoluene, 2-	95-49-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Chlorotoluene, 4-	106-43-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Cymene, p-	99-87-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibromochloromethane	124-48-1	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibromoethane, 1,2-	106-93-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibromomethane	74-95-3	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichlorobenzene, 1,2-	95-50-1	E611E/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----	
Dichlorobenzene, 1,3-	541-73-1	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichlorobenzene, 1,4-	106-46-7	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichlorodifluoromethane	75-71-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloroethane, 1,1-	75-34-3	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloroethane, 1,2-	107-06-2	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloroethylene, 1,1-	75-35-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloroethylene, cis-1,2-	156-59-2	E611E/CG	1.0	µg/L	17.4	1.5	235	15.4	----	
Dichloroethylene, trans-1,2-	156-60-5	E611E/CG	1.0	µg/L	3.7	<1.0	17.7	3.3	----	
Dichloromethane	75-09-2	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloropropane, 1,2-	78-87-5	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloropropane, 1,3-	142-28-9	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloropropane, 2,2-	594-20-7	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloropropylene, 1,1-	563-58-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloropropylene, cis+trans-1,3-	542-75-6	E611E/CG	1.5	µg/L	<1.5	<1.5	<1.5	<1.5	----	
Dichloropropylene, cis-1,3-	10061-01-5	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dichloropropylene, trans-1,3-	10061-02-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Ethylbenzene	100-41-4	E611A/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----	
Hexachlorobutadiene	87-68-3	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Isopropylbenzene	98-82-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----	
Propylbenzene, n-	103-65-1	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	



Analytical Results

Sub-Matrix: Water					Client sample ID	MW-01	MW-04A	MW-05	DUPLICATE	----
(Matrix: Water)					Client sampling date / time	06-Sep-2024 07:15	06-Sep-2024 07:45	06-Sep-2024 08:00	06-Sep-2024 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412792-001	CG2412792-002	CG2412792-003	CG2412792-004	-----	----
					Result	Result	Result	Result	----	----
Volatile Organic Compounds										
Styrene	100-42-5	E611E/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Tetrachloroethylene	127-18-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Toluene	108-88-3	E611A/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trichloroethane, 1,1,1-	71-55-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trichloroethane, 1,1,2-	79-00-5	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trichloroethylene	79-01-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trichlorofluoromethane	75-69-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trichloropropane, 1,2,3-	96-18-4	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trimethylbenzene, 1,2,4-	95-63-6	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E611E/CG	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	----
Vinyl chloride	75-01-4	E611E/CG	1.0	µg/L	6.1	<1.0	9.8	4.3	----	----
Xylene, m+p-	179601-23-1	E611A/CG	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	<0.40	----
Xylene, o-	95-47-6	E611A/CG	0.30	µg/L	<0.30	<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A/CG	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50	----
BTEX, total	----	E611E/CG	1.0	µg/L	2.4	<1.0	1.8	2.2	----	----
Trihalomethanes [THMs], total	----	E611E/CG	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0	----
Hydrocarbons										
F1 (C6-C10)	----	E581.F1/CG	100	µg/L	<100	<100	<100	<100	<100	----
F1-BTEX	----	EC580/CG	25	µg/L	<100	<100	<100	<100	<100	----
F2 (C10-C16)	----	E601/CG	100	µg/L	<100	<100	<100	<100	<100	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601/CG	1.0	%	103	96.3	95.9	103	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.F1/CG	1.0	%	110	112	110	111	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/CG	1.0	%	76.3	75.8	72.6	72.4	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/CG	1.0	%	102	104	102	102	----	----

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Work Order : CG2412792
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.004



Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : CG2412792</p> <p>Client : Tetra Tech Canada Inc.</p> <p>Contact : Darby Madalena</p> <p>Address : 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3</p> <p>Telephone : 403 203 3355</p> <p>Project : SWM.SWOP04071-04.004</p> <p>PO : SWM.SWOP04071-04.004</p> <p>C-O-C number : CORD RED DEER MOTORS</p> <p>Sampler : WILLEM VERDUYN</p> <p>Site :</p> <p>Quote number : CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites</p> <p>No. of samples received : 4</p> <p>No. of samples analysed : 4</p>	<p>Page : 1 of 14</p> <p>Laboratory : ALS Environmental - Calgary</p> <p>Account Manager : Patryk Wojciak</p> <p>Address : 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5</p> <p>Telephone : +1 403 407 1800</p> <p>Date Samples Received : 06-Sep-2024 15:00</p> <p>Issue Date : 12-Sep-2024 10:06</p>
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This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
- DQO: Data Quality Objective.
- LOR: Limit of Reporting (detection limit).
- RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC										
HDPE DUPLICATE	E235.Cl	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-01	E235.Cl	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-04A	E235.Cl	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔
Anions and Nutrients : Chloride in Water by IC										
HDPE MW-05	E235.Cl	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔
Anions and Nutrients : Fluoride in Water by IC										
HDPE DUPLICATE	E235.F	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-01	E235.F	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-04A	E235.F	06-Sep-2024	07-Sep-2024	28 days	1 days	✔	07-Sep-2024	28 days	1 days	✔



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE MW-05	E235.F	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE DUPLICATE	E235.NO3	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MW-01	E235.NO3	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MW-04A	E235.NO3	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE MW-05	E235.NO3	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE DUPLICATE	E235.NO2	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MW-01	E235.NO2	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MW-04A	E235.NO2	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE MW-05	E235.NO2	06-Sep-2024	07-Sep-2024	3 days	1 days	✓	07-Sep-2024	3 days	1 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Sulfate in Water by IC										
HDPE DUPLICATE	E235.SO4	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-01	E235.SO4	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-04A	E235.SO4	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE MW-05	E235.SO4	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) DUPLICATE	E509	06-Sep-2024	10-Sep-2024	28 days	4 days	✓	10-Sep-2024	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-01	E509	06-Sep-2024	10-Sep-2024	28 days	4 days	✓	10-Sep-2024	28 days	4 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) MW-05	E509	06-Sep-2024	10-Sep-2024	28 days	4 days	✓	10-Sep-2024	28 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) DUPLICATE	E421	06-Sep-2024	10-Sep-2024	180 days	4 days	✓	11-Sep-2024	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-01	E421	06-Sep-2024	10-Sep-2024	180 days	4 days	✓	11-Sep-2024	180 days	5 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-04A	E421	06-Sep-2024	10-Sep-2024	180 days	4 days	✓	11-Sep-2024	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) MW-05	E421	06-Sep-2024	10-Sep-2024	180 days	4 days	✓	11-Sep-2024	180 days	5 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUPLICATE	E581.F1	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW-01	E581.F1	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW-04A	E581.F1	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW-05	E581.F1	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUPLICATE	E601	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW-01	E601	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW-04A	E601	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	40 days	0 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID											
Amber glass/Teflon lined cap (sodium bisulfate) MW-05	E601	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	40 days	0 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE DUPLICATE	E290	06-Sep-2024	07-Sep-2024	14 days	1 days	✓	07-Sep-2024	14 days	1 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE MW-01	E290	06-Sep-2024	07-Sep-2024	14 days	1 days	✓	07-Sep-2024	14 days	1 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE MW-04A	E290	06-Sep-2024	07-Sep-2024	14 days	1 days	✓	07-Sep-2024	14 days	1 days	✓	
Physical Tests : Alkalinity Species by Titration											
HDPE MW-05	E290	06-Sep-2024	07-Sep-2024	14 days	1 days	✓	07-Sep-2024	14 days	1 days	✓	
Physical Tests : Conductivity in Water											
HDPE DUPLICATE	E100	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW-01	E100	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW-04A	E100	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓	
Physical Tests : Conductivity in Water											
HDPE MW-05	E100	06-Sep-2024	07-Sep-2024	28 days	1 days	✓	07-Sep-2024	28 days	1 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter											
HDPE DUPLICATE	E108	06-Sep-2024	07-Sep-2024	0.25 hrs	25 hrs	* EHTL	07-Sep-2024	0.25 hrs	25 hrs	* EHTL	
Physical Tests : pH by Meter											
HDPE MW-04A	E108	06-Sep-2024	07-Sep-2024	0.25 hrs	32 hrs	* EHTR-FM	07-Sep-2024	0.25 hrs	32 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW-05	E108	06-Sep-2024	07-Sep-2024	0.25 hrs	32 hrs	* EHTR-FM	07-Sep-2024	0.25 hrs	32 hrs	* EHTR-FM	
Physical Tests : pH by Meter											
HDPE MW-01	E108	06-Sep-2024	07-Sep-2024	0.25 hrs	33 hrs	* EHTR-FM	07-Sep-2024	0.25 hrs	33 hrs	* EHTR-FM	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) DUPLICATE	E611A	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) MW-01	E611A	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) MW-04A	E611A	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓	
Volatile Organic Compounds : BTEX by Headspace GC-MS											
Glass vial (sodium bisulfate) MW-05	E611A	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓	
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS											
Glass vial (sodium bisulfate) DUPLICATE	E611E	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓	



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-01	E611E	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-04A	E611E	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓
Volatile Organic Compounds : VOCs (Prairies List) by Headspace GC-MS										
Glass vial (sodium bisulfate) MW-05	E611E	06-Sep-2024	09-Sep-2024	14 days	3 days	✓	09-Sep-2024	14 days	3 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1639034	1	17	5.8	5.0	✔
BTEX by Headspace GC-MS	E611A	1640140	1	4	25.0	5.0	✔
CCME PHC - F1 by Headspace GC-FID	E581.F1	1640139	1	4	25.0	5.0	✔
Chloride in Water by IC	E235.Cl	1638965	1	4	25.0	5.0	✔
Conductivity in Water	E100	1639032	1	17	5.8	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1642121	1	15	6.6	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1643007	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1638957	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1638963	1	4	25.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1638964	1	4	25.0	5.0	✔
pH by Meter	E108	1639033	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1638962	1	20	5.0	5.0	✔
VOCs (Prairies List) by Headspace GC-MS	E611E	1640141	1	4	25.0	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1639034	1	17	5.8	5.0	✔
BTEX by Headspace GC-MS	E611A	1640140	1	4	25.0	5.0	✔
CCME PHC - F1 by Headspace GC-FID	E581.F1	1640139	1	4	25.0	5.0	✔
CCME PHCs - F2-F4 by GC-FID	E601	1639978	1	11	9.0	5.0	✔
Chloride in Water by IC	E235.Cl	1638965	1	4	25.0	5.0	✔
Conductivity in Water	E100	1639032	1	17	5.8	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1642121	1	15	6.6	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1643007	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1638957	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1638963	1	4	25.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1638964	1	4	25.0	5.0	✔
pH by Meter	E108	1639033	1	20	5.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1638962	1	20	5.0	5.0	✔
VOCs (Prairies List) by Headspace GC-MS	E611E	1640141	1	4	25.0	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1639034	1	17	5.8	5.0	✔
BTEX by Headspace GC-MS	E611A	1640140	1	4	25.0	5.0	✔
CCME PHC - F1 by Headspace GC-FID	E581.F1	1640139	1	4	25.0	5.0	✔
CCME PHCs - F2-F4 by GC-FID	E601	1639978	1	11	9.0	5.0	✔
Chloride in Water by IC	E235.Cl	1638965	1	4	25.0	5.0	✔
Conductivity in Water	E100	1639032	1	17	5.8	5.0	✔



Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Method Blanks (MB) - Continued							
Dissolved Mercury in Water by CVAAS	E509	1642121	1	15	6.6	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1643007	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1638957	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1638963	1	4	25.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1638964	1	4	25.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1638962	1	20	5.0	5.0	✔
VOCs (Prairies List) by Headspace GC-MS	E611E	1640141	1	4	25.0	5.0	✔
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1640140	1	4	25.0	5.0	✔
Chloride in Water by IC	E235.Cl	1638965	1	4	25.0	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	1642121	1	15	6.6	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	1643007	1	20	5.0	5.0	✔
Fluoride in Water by IC	E235.F	1638957	1	20	5.0	5.0	✔
Nitrate in Water by IC	E235.NO3	1638963	1	4	25.0	5.0	✔
Nitrite in Water by IC	E235.NO2	1638964	1	4	25.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1638962	1	20	5.0	5.0	✔
VOCs (Prairies List) by Headspace GC-MS	E611E	1640141	1	4	25.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 ALS Environmental - Calgary	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Calgary	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Chloride in Water by IC	E235.Cl ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Calgary	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Calgary	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Calgary	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury in Water by CVAAS	E509 ALS Environmental - Calgary	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
CCME PHC - F1 by Headspace GC-FID	E581.F1 ALS Environmental - Calgary	Water	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
CCME PHCs - F2-F4 by GC-FID	E601 ALS Environmental - Calgary	Water	CCME PHC in Soil - Tier 1	Sample extracts are analyzed by GC-FID for CCME hydrocarbon fractions (F2-F4). Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BTEX by Headspace GC-MS	E611A ALS Environmental - Calgary	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VOCs (Prairies List) by Headspace GC-MS	E611E ALS Environmental - Calgary	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Calgary	Water	APHA 2340B	"Hardness (as CaCO ₃), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Calgary	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
TDS in Water (Calculation)	EC103 ALS Environmental - Calgary	Water	APHA 1030E (mod)	Total Dissolved Solids is calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Calgary	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
F1-BTEX	EC580 ALS Environmental - Calgary	Water	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Calgary	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO ₃ .
Dissolved Mercury Water Filtration	EP509 ALS Environmental - Calgary	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Calgary	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Calgary	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order : **CG2412792**

Client : Tetra Tech Canada Inc.

Contact : Darby Madalena

Address : 110, 140 Quarry Park Blvd SE
Calgary AB Canada T2C 3G3

Telephone : 403 203 3355

Project : SWM.SWOP04071-04.004

PO : SWM.SWOP04071-04.004

C-O-C number : CORD RED DEER MOTORS

Sampler : WILLEM VERDUYN

Site :

Quote number : CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill
Sites

No. of samples received : 4

No. of samples analysed : 4

Page : 1 of 17

Laboratory : ALS Environmental - Calgary

Account Manager : Patryk Wojciak

Address : 2559 29th Street NE
Calgary, Alberta Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 06-Sep-2024 15:00

Date Analysis Commenced : 07-Sep-2024

Issue Date : 12-Sep-2024 10:05

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Cynthia Bauer	Organic Supervisor	Calgary Organics, Calgary, Alberta
Gurvinder Kour	Lab Assistant	Calgary Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Katarzyna Glinka	Analyst	Calgary Inorganics, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Calgary Organics, Calgary, Alberta
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Shirley Li	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta

Page : 2 of 17
Work Order : CG2412792
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.004



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1639032)											
CG2412760-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	1940	1940	0.154%	10%	----
Physical Tests (QC Lot: 1639033)											
CG2412760-001	Anonymous	pH	----	E108	0.10	pH units	8.09	7.84	3.14%	4%	----
Physical Tests (QC Lot: 1639034)											
CG2412760-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	408	402	1.46%	20%	----
Anions and Nutrients (QC Lot: 1638957)											
CG2412779-001	Anonymous	Fluoride	16984-48-8	E235.F	0.100	mg/L	0.248	0.247	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1638962)											
CG2412779-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	846	837	0.977%	20%	----
Anions and Nutrients (QC Lot: 1638963)											
CG2412792-001	MW-01	Nitrate (as N)	14797-55-8	E235.NO3	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1638964)											
CG2412792-001	MW-01	Nitrite (as N)	14797-65-0	E235.NO2	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1638965)											
CG2412792-001	MW-01	Chloride	16887-00-6	E235.Cl	2.50	mg/L	460	456	0.789%	20%	----
Dissolved Metals (QC Lot: 1642121)											
CG2412769-001	Anonymous	Mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1643007)											
CG2412792-001	MW-01	Aluminum, dissolved	7429-90-5	E421	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	0.0228	0.0232	1.76%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00020	mg/L	0.616	0.633	2.78%	20%	----
		Boron, dissolved	7440-42-8	E421	0.020	mg/L	0.073	0.074	0.0005	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	<0.0000100	<0.0000100	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.100	mg/L	153	158	3.15%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.020	mg/L	25.3	24.9	1.79%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	98.5	97.8	0.713%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1643007) - continued											
CG2412792-001	MW-01	Manganese, dissolved	7439-96-5	E421	0.00020	mg/L	1.86	1.92	3.34%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00100	mg/L	0.0137	0.0136	0.549%	20%	----
		Potassium, dissolved	7440-09-7	E421	0.100	mg/L	7.71	7.74	0.458%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000100	mg/L	0.000116	0.000104	0.000012	Diff <2x LOR	----
		Silver, dissolved	7440-22-4	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.100	mg/L	214	218	1.84%	20%	----
		Uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.00287	0.00275	4.32%	20%	----
		Zinc, dissolved	7440-66-6	E421	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1640140)											
CG2412792-001	MW-01	Benzene	71-43-2	E611A	0.50	µg/L	2.42	2.63	0.21	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1640141)											
CG2412792-001	MW-01	Bromobenzene	108-86-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromochloromethane	74-97-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromoform	75-25-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, n-	104-51-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, sec-	135-98-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, tert-	98-06-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloromethane	74-87-3	E611E	5.0	µg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Chlorotoluene, 2-	95-49-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chlorotoluene, 4-	106-43-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Cymene, p-	99-87-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Dibromoethane, 1,2-	106-93-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----		



Sub-Matrix: Water

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1640141) - continued											
CG2412792-001	MW-01	Dibromomethane	74-95-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611E	1.0	µg/L	17.4	18.9	8.14%	30%	----
		Dichloroethylene, trans-1,2-	156-60-5	E611E	1.0	µg/L	3.7	4.1	0.4	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,3-	142-28-9	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 2,2-	594-20-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, 1,1-	563-58-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Hexachlorobutadiene	87-68-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Propylbenzene, n-	103-65-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Styrene	100-42-5	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,3-	87-61-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,4-	120-82-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloropropane, 1,2,3-	96-18-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----

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 Work Order : CG2412792
 Client : Tetra Tech Canada Inc.
 Project : SWM.SWOP04071-04.004



Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Volatile Organic Compounds (QC Lot: 1640141) - continued											
CG2412792-001	MW-01	Vinyl chloride	75-01-4	E611E	1.0	µg/L	6.1	5.6	8.59%	50%	----
Hydrocarbons (QC Lot: 1640139)											
CG2412792-001	MW-01	F1 (C6-C10)	----	E581.F1	100	µg/L	<100	<100	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1639032)						
Conductivity	---	E100	1	µS/cm	<1.0	---
Physical Tests (QCLot: 1639034)						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
Anions and Nutrients (QCLot: 1638957)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1638962)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Anions and Nutrients (QCLot: 1638963)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1638964)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
Anions and Nutrients (QCLot: 1638965)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
Dissolved Metals (QCLot: 1642121)						
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	---
Dissolved Metals (QCLot: 1643007)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	---
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	---
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	---
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	---
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	---
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	---
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	---
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	---
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	---
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	---
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	---
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	---
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	---
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	---
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	---
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1643007) - continued						
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 1640140)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 1640141)						
Bromobenzene	108-86-1	E611E	1	µg/L	<1.0	----
Bromochloromethane	74-97-5	E611E	1	µg/L	<1.0	----
Bromodichloromethane	75-27-4	E611E	1	µg/L	<1.0	----
Bromoform	75-25-2	E611E	1	µg/L	<1.0	----
Bromomethane	74-83-9	E611E	1	µg/L	<1.0	----
Butylbenzene, n-	104-51-8	E611E	1	µg/L	<1.0	----
Butylbenzene, sec-	135-98-8	E611E	1	µg/L	<1.0	----
Butylbenzene, tert-	98-06-6	E611E	1	µg/L	<1.0	----
Carbon tetrachloride	56-23-5	E611E	0.5	µg/L	<0.50	----
Chlorobenzene	108-90-7	E611E	1	µg/L	<1.0	----
Chloroethane	75-00-3	E611E	1	µg/L	<1.0	----
Chloroform	67-66-3	E611E	1	µg/L	<1.0	----
Chloromethane	74-87-3	E611E	5	µg/L	<5.0	----
Chlorotoluene, 2-	95-49-8	E611E	1	µg/L	<1.0	----
Chlorotoluene, 4-	106-43-4	E611E	1	µg/L	<1.0	----
Cymene, p-	99-87-6	E611E	1	µg/L	<1.0	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1	µg/L	<1.0	----
Dibromochloromethane	124-48-1	E611E	1	µg/L	<1.0	----
Dibromoethane, 1,2-	106-93-4	E611E	1	µg/L	<1.0	----
Dibromomethane	74-95-3	E611E	1	µg/L	<1.0	----
Dichlorobenzene, 1,2-	95-50-1	E611E	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,3-	541-73-1	E611E	1	µg/L	<1.0	----
Dichlorobenzene, 1,4-	106-46-7	E611E	1	µg/L	<1.0	----
Dichlorodifluoromethane	75-71-8	E611E	1	µg/L	<1.0	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1640141) - continued						
Dichloroethane, 1,1-	75-34-3	E611E	1	µg/L	<1.0	----
Dichloroethane, 1,2-	107-06-2	E611E	1	µg/L	<1.0	----
Dichloroethylene, 1,1-	75-35-4	E611E	1	µg/L	<1.0	----
Dichloroethylene, cis-1,2-	156-59-2	E611E	1	µg/L	<1.0	----
Dichloroethylene, trans-1,2-	156-60-5	E611E	1	µg/L	<1.0	----
Dichloromethane	75-09-2	E611E	1	µg/L	<1.0	----
Dichloropropane, 1,2-	78-87-5	E611E	1	µg/L	<1.0	----
Dichloropropane, 1,3-	142-28-9	E611E	1	µg/L	<1.0	----
Dichloropropane, 2,2-	594-20-7	E611E	1	µg/L	<1.0	----
Dichloropropylene, 1,1-	563-58-6	E611E	1	µg/L	<1.0	----
Dichloropropylene, cis-1,3-	10061-01-5	E611E	1	µg/L	<1.0	----
Dichloropropylene, trans-1,3-	10061-02-6	E611E	1	µg/L	<1.0	----
Hexachlorobutadiene	87-68-3	E611E	1	µg/L	<1.0	----
Isopropylbenzene	98-82-8	E611E	1	µg/L	<1.0	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.5	µg/L	<0.50	----
Propylbenzene, n-	103-65-1	E611E	1	µg/L	<1.0	----
Styrene	100-42-5	E611E	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1	µg/L	<1.0	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1	µg/L	<1.0	----
Tetrachloroethylene	127-18-4	E611E	1	µg/L	<1.0	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E	1	µg/L	<1.0	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E	1	µg/L	<1.0	----
Trichloroethane, 1,1,1-	71-55-6	E611E	1	µg/L	<1.0	----
Trichloroethane, 1,1,2-	79-00-5	E611E	1	µg/L	<1.0	----
Trichloroethylene	79-01-6	E611E	1	µg/L	<1.0	----
Trichlorofluoromethane	75-69-4	E611E	1	µg/L	<1.0	----
Trichloropropane, 1,2,3-	96-18-4	E611E	1	µg/L	<1.0	----
Trimethylbenzene, 1,2,4-	95-63-6	E611E	1	µg/L	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E611E	1	µg/L	<1.0	----
Vinyl chloride	75-01-4	E611E	1	µg/L	<1.0	----
Hydrocarbons (QCLot: 1639978)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----
Hydrocarbons (QCLot: 1640139)						
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----

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Work Order : CG2412792
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.004





Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1639032)									
Conductivity	---	E100	1	µS/cm	147 µS/cm	102	90.0	110	---
Physical Tests (QCLot: 1639033)									
pH	---	E108	---	pH units	7 pH units	101	98.0	102	---
Physical Tests (QCLot: 1639034)									
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	500 mg/L	105	85.0	115	---
Anions and Nutrients (QCLot: 1638957)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.6	90.0	110	---
Anions and Nutrients (QCLot: 1638962)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.4	90.0	110	---
Anions and Nutrients (QCLot: 1638963)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	98.7	90.0	110	---
Anions and Nutrients (QCLot: 1638964)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.3	90.0	110	---
Anions and Nutrients (QCLot: 1638965)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.2	90.0	110	---
Mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0 mg/L	111	80.0	120	---
Dissolved Metals (QCLot: 1643007)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	---
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	96.1	80.0	120	---
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	---
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	---
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	91.8	80.0	120	---
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.9	80.0	120	---
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	91.7	80.0	120	---
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.6	80.0	120	---
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.6	80.0	120	---
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	96.8	80.0	120	---
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	---
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.3	80.0	120	---
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.8	80.0	120	---



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1643007) - continued									
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.0	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.8	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	89.6	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	90.4	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	98.6	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	100	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.1	80.0	120	----
Volatile Organic Compounds (QCLot: 1640140)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	98.8	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	78.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	87.1	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	93.4	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	84.1	70.0	130	----
Volatile Organic Compounds (QCLot: 1640141)									
Bromobenzene	108-86-1	E611E	1	µg/L	100 µg/L	93.8	70.0	130	----
Bromochloromethane	74-97-5	E611E	1	µg/L	100 µg/L	94.0	70.0	130	----
Bromodichloromethane	75-27-4	E611E	1	µg/L	100 µg/L	108	70.0	130	----
Bromoform	75-25-2	E611E	1	µg/L	100 µg/L	82.8	70.0	130	----
Bromomethane	74-83-9	E611E	1	µg/L	100 µg/L	127	60.0	140	----
Butylbenzene, n-	104-51-8	E611E	1	µg/L	100 µg/L	70.9	70.0	130	----
Butylbenzene, sec-	135-98-8	E611E	1	µg/L	100 µg/L	76.8	70.0	130	----
Butylbenzene, tert-	98-06-6	E611E	1	µg/L	100 µg/L	77.4	70.0	130	----
Carbon tetrachloride	56-23-5	E611E	0.5	µg/L	100 µg/L	78.0	70.0	130	----
Chlorobenzene	108-90-7	E611E	1	µg/L	100 µg/L	114	70.0	130	----
Chloroethane	75-00-3	E611E	1	µg/L	100 µg/L	101	60.0	140	----
Chloroform	67-66-3	E611E	1	µg/L	100 µg/L	103	70.0	130	----
Chloromethane	74-87-3	E611E	5	µg/L	100 µg/L	111	60.0	140	----
Chlorotoluene, 2-	95-49-8	E611E	1	µg/L	100 µg/L	94.6	70.0	130	----
Chlorotoluene, 4-	106-43-4	E611E	1	µg/L	100 µg/L	94.6	70.0	130	----
Cymene, p-	99-87-6	E611E	1	µg/L	100 µg/L	82.9	70.0	130	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1	µg/L	100 µg/L	95.7	70.0	130	----
Dibromochloromethane	124-48-1	E611E	1	µg/L	100 µg/L	94.6	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611E	1	µg/L	100 µg/L	110	70.0	130	----
Dibromomethane	74-95-3	E611E	1	µg/L	100 µg/L	91.2	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611E	0.5	µg/L	100 µg/L	95.2	70.0	130	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1640141) - continued									
Dichlorobenzene, 1,3-	541-73-1	E611E	1	µg/L	100 µg/L	92.3	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611E	1	µg/L	100 µg/L	94.9	70.0	130	----
Dichlorodifluoromethane	75-71-8	E611E	1	µg/L	100 µg/L	129	60.0	140	----
Dichloroethane, 1,1-	75-34-3	E611E	1	µg/L	100 µg/L	109	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E611E	1	µg/L	100 µg/L	122	70.0	130	----
Dichloroethylene, 1,1-	75-35-4	E611E	1	µg/L	100 µg/L	96.7	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611E	1	µg/L	100 µg/L	114	70.0	130	----
Dichloroethylene, trans-1,2-	156-60-5	E611E	1	µg/L	100 µg/L	106	70.0	130	----
Dichloromethane	75-09-2	E611E	1	µg/L	100 µg/L	114	70.0	130	----
Dichloropropane, 1,2-	78-87-5	E611E	1	µg/L	100 µg/L	112	70.0	130	----
Dichloropropane, 1,3-	142-28-9	E611E	1	µg/L	100 µg/L	124	70.0	130	----
Dichloropropane, 2,2-	594-20-7	E611E	1	µg/L	100 µg/L	80.4	70.0	130	----
Dichloropropylene, 1,1-	563-58-6	E611E	1	µg/L	100 µg/L	88.7	70.0	130	----
Dichloropropylene, cis-1,3-	10061-01-5	E611E	1	µg/L	100 µg/L	97.0	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611E	1	µg/L	100 µg/L	97.7	70.0	130	----
Hexachlorobutadiene	87-68-3	E611E	1	µg/L	100 µg/L	81.7	70.0	130	----
Isopropylbenzene	98-82-8	E611E	1	µg/L	100 µg/L	90.6	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.5	µg/L	100 µg/L	104	70.0	130	----
Propylbenzene, n-	103-65-1	E611E	1	µg/L	100 µg/L	81.9	70.0	130	----
Styrene	100-42-5	E611E	0.5	µg/L	100 µg/L	92.1	70.0	130	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1	µg/L	100 µg/L	91.3	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1	µg/L	100 µg/L	126	70.0	130	----
Tetrachloroethylene	127-18-4	E611E	1	µg/L	100 µg/L	72.4	70.0	130	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E	1	µg/L	100 µg/L	74.9	70.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E	1	µg/L	100 µg/L	72.7	70.0	130	----
Trichloroethane, 1,1,1-	71-55-6	E611E	1	µg/L	100 µg/L	79.5	70.0	130	----
Trichloroethane, 1,1,2-	79-00-5	E611E	1	µg/L	100 µg/L	130	70.0	130	----
Trichloroethylene	79-01-6	E611E	1	µg/L	100 µg/L	76.5	70.0	130	----
Trichlorofluoromethane	75-69-4	E611E	1	µg/L	100 µg/L	86.5	60.0	140	----
Trichloropropane, 1,2,3-	96-18-4	E611E	1	µg/L	100 µg/L	125	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E611E	1	µg/L	100 µg/L	77.0	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E611E	1	µg/L	100 µg/L	77.7	70.0	130	----
Vinyl chloride	75-01-4	E611E	1	µg/L	100 µg/L	107	60.0	140	----
Hydrocarbons (QCLot: 1639978)									
F2 (C10-C16)	---	E601	100	µg/L	3830 µg/L	84.9	70.0	130	----

Page : 14 of 17
 Work Order : CG2412792
 Client : Tetra Tech Canada Inc.
 Project : SWM.SWOP04071-04.004



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 1640139)									
F1 (C6-C10)	----	E581.F1	100	µg/L	2480 µg/L	105	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1638957)										
CG2412779-009	Anonymous	Fluoride	16984-48-8	E235.F	0.987 mg/L	1 mg/L	98.7	75.0	125	----
Anions and Nutrients (QCLot: 1638962)										
CG2412779-009	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	98.9 mg/L	100 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 1638963)										
CG2412792-002	MW-04A	Nitrate (as N)	14797-55-8	E235.NO3	2.50 mg/L	2.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 1638964)										
CG2412792-002	MW-04A	Nitrite (as N)	14797-65-0	E235.NO2	0.504 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 1638965)										
CG2412792-002	MW-04A	Chloride	16887-00-6	E235.Cl	ND mg/L	----	ND	75.0	125	----
Dissolved Metals (QCLot: 1642121)										
CG2412769-002	Anonymous	Mercury, dissolved	7439-97-6	E509	0.000125 mg/L	0 mg/L	125	70.0	130	----
Dissolved Metals (QCLot: 1643007)										
CG2412792-002	MW-04A	Aluminum, dissolved	7429-90-5	E421	2.01 mg/L	2 mg/L	101	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.191 mg/L	0.2 mg/L	95.5	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.882 mg/L	1 mg/L	88.2	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	----	ND	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.379 mg/L	0.4 mg/L	94.8	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.189 mg/L	0.2 mg/L	94.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	18.8 mg/L	20 mg/L	93.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.187 mg/L	0.2 mg/L	93.6	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	----	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	----	ND	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.373 mg/L	0.4 mg/L	93.2	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	39.0 mg/L	40 mg/L	97.4	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.358 mg/L	0.4 mg/L	89.6	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.0360 mg/L	0.04 mg/L	90.0	70.0	130	----
Sodium, dissolved	7440-23-5	E421	ND mg/L	----	ND	70.0	130	----		
Uranium, dissolved	7440-61-1	E421	ND mg/L	----	ND	70.0	130	----		
Zinc, dissolved	7440-66-6	E421	3.67 mg/L	4 mg/L	91.7	70.0	130	----		
Volatile Organic Compounds (QCLot: 1640140)										
CG2412792-001	MW-01	Benzene	71-43-2	E611A	112 µg/L	100 µg/L	112	70.0	130	----
		Ethylbenzene	100-41-4	E611A	79.4 µg/L	100 µg/L	79.4	70.0	130	----



Sub-Matrix: Water

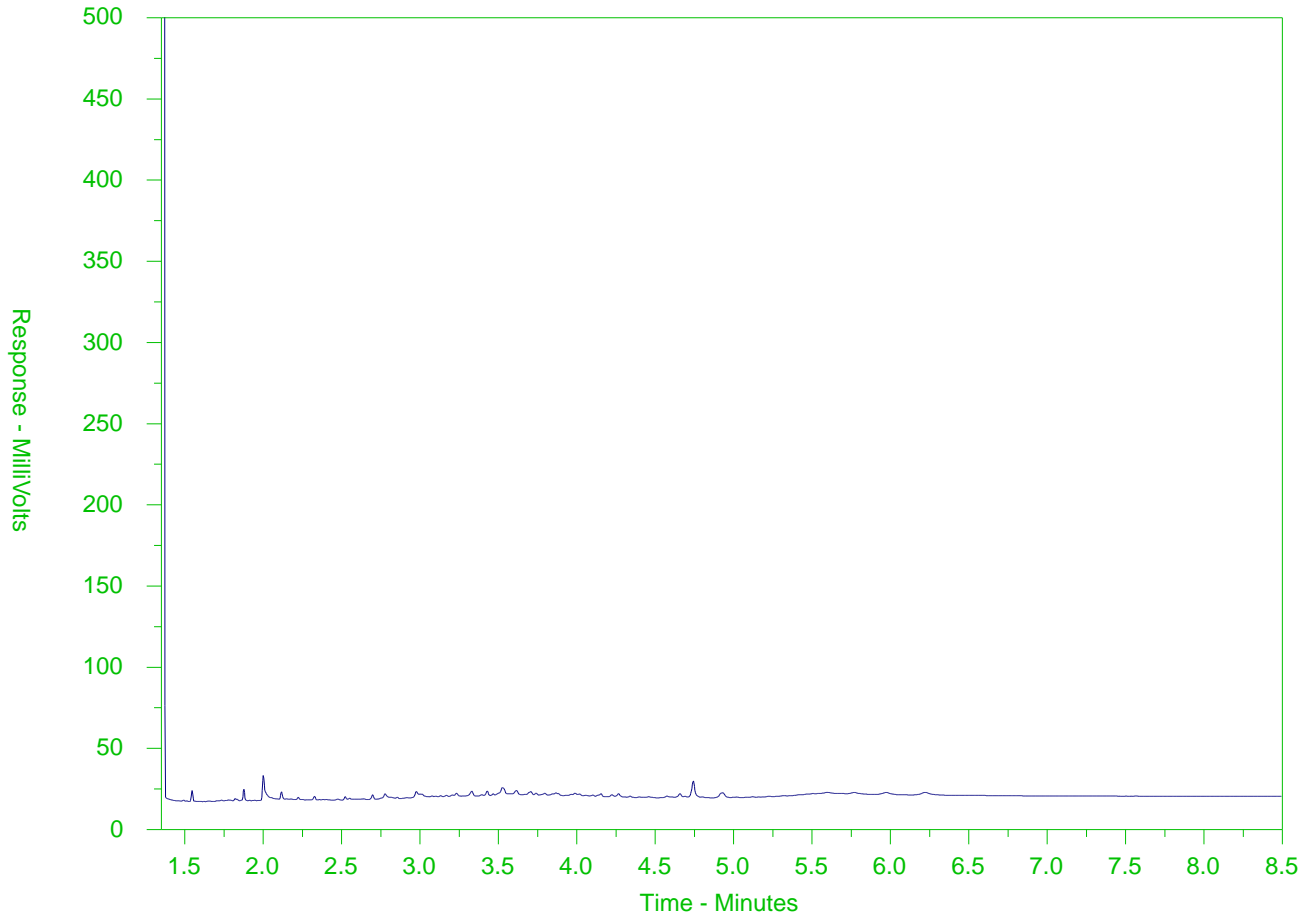
					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1640140) - continued										
CG2412792-001	MW-01	Toluene	108-88-3	E611A	88.3 µg/L	100 µg/L	88.3	70.0	130	----
		Xylene, m+p-	179601-23-1	E611A	196 µg/L	200 µg/L	98.0	70.0	130	----
		Xylene, o-	95-47-6	E611A	88.0 µg/L	100 µg/L	88.0	70.0	130	----
Volatile Organic Compounds (QCLot: 1640141)										
CG2412792-001	MW-01	Bromobenzene	108-86-1	E611E	89.4 µg/L	100 µg/L	89.4	70.0	130	----
		Bromochloromethane	74-97-5	E611E	111 µg/L	100 µg/L	111	70.0	130	----
		Bromodichloromethane	75-27-4	E611E	122 µg/L	100 µg/L	122	70.0	130	----
		Bromoform	75-25-2	E611E	79.2 µg/L	100 µg/L	79.2	70.0	130	----
		Bromomethane	74-83-9	E611E	125 µg/L	100 µg/L	125	60.0	140	----
		Butylbenzene, n-	104-51-8	E611E	72.8 µg/L	100 µg/L	72.8	70.0	130	----
		Butylbenzene, sec-	135-98-8	E611E	71.5 µg/L	100 µg/L	71.5	70.0	130	----
		Butylbenzene, tert-	98-06-6	E611E	70.8 µg/L	100 µg/L	70.8	70.0	130	----
		Carbon tetrachloride	56-23-5	E611E	76.5 µg/L	100 µg/L	76.5	70.0	130	----
		Chlorobenzene	108-90-7	E611E	129 µg/L	100 µg/L	129	70.0	130	----
		Chloroethane	75-00-3	E611E	104 µg/L	100 µg/L	104	60.0	140	----
		Chloroform	67-66-3	E611E	118 µg/L	100 µg/L	118	70.0	130	----
		Chloromethane	74-87-3	E611E	123 µg/L	100 µg/L	123	60.0	140	----
		Chlorotoluene, 2-	95-49-8	E611E	86.5 µg/L	100 µg/L	86.5	70.0	130	----
		Chlorotoluene, 4-	106-43-4	E611E	91.0 µg/L	100 µg/L	91.0	70.0	130	----
		Cymene, p-	99-87-6	E611E	72.8 µg/L	100 µg/L	72.8	70.0	130	----
		Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	95.5 µg/L	100 µg/L	95.5	70.0	130	----
		Dibromochloromethane	124-48-1	E611E	111 µg/L	100 µg/L	111	70.0	130	----
		Dibromoethane, 1,2-	106-93-4	E611E	122 µg/L	100 µg/L	122	70.0	130	----
		Dibromomethane	74-95-3	E611E	108 µg/L	100 µg/L	108	70.0	130	----
		Dichlorobenzene, 1,2-	95-50-1	E611E	95.5 µg/L	100 µg/L	95.5	70.0	130	----
		Dichlorobenzene, 1,3-	541-73-1	E611E	92.2 µg/L	100 µg/L	92.2	70.0	130	----
		Dichlorobenzene, 1,4-	106-46-7	E611E	94.3 µg/L	100 µg/L	94.3	70.0	130	----
		Dichlorodifluoromethane	75-71-8	E611E	123 µg/L	100 µg/L	123	60.0	140	----
		Dichloroethane, 1,1-	75-34-3	E611E	101 µg/L	100 µg/L	101	70.0	130	----
		Dichloroethane, 1,2-	107-06-2	E611E	124 µg/L	100 µg/L	124	70.0	130	----
		Dichloroethylene, 1,1-	75-35-4	E611E	108 µg/L	100 µg/L	108	70.0	130	----
		Dichloroethylene, cis-1,2-	156-59-2	E611E	105 µg/L	100 µg/L	105	70.0	130	----
		Dichloroethylene, trans-1,2-	156-60-5	E611E	121 µg/L	100 µg/L	121	70.0	130	----
		Dichloromethane	75-09-2	E611E	130 µg/L	100 µg/L	130	70.0	130	----
		Dichloropropane, 1,2-	78-87-5	E611E	130 µg/L	100 µg/L	130	70.0	130	----
		Dichloropropane, 1,3-	142-28-9	E611E	118 µg/L	100 µg/L	118	70.0	130	----
		Dichloropropane, 2,2-	594-20-7	E611E	91.4 µg/L	100 µg/L	91.4	70.0	130	----
Dichloropropylene, 1,1-	563-58-6	E611E	98.4 µg/L	100 µg/L	98.4	70.0	130	----		
Dichloropropylene, cis-1,3-	10061-01-5	E611E	106 µg/L	100 µg/L	106	70.0	130	----		
Dichloropropylene, trans-1,3-	10061-02-6	E611E	105 µg/L	100 µg/L	105	70.0	130	----		
Hexachlorobutadiene	87-68-3	E611E	81.5 µg/L	100 µg/L	81.5	70.0	130	----		
Isopropylbenzene	98-82-8	E611E	96.5 µg/L	100 µg/L	96.5	70.0	130	----		
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	105 µg/L	100 µg/L	105	70.0	130	----		
Propylbenzene, n-	103-65-1	E611E	83.1 µg/L	100 µg/L	83.1	70.0	130	----		



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1640141) - continued										
CG2412792-001	MW-01	Styrene	100-42-5	E611E	93.5 µg/L	100 µg/L	93.5	70.0	130	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	107 µg/L	100 µg/L	107	70.0	130	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	126 µg/L	100 µg/L	126	70.0	130	----
		Tetrachloroethylene	127-18-4	E611E	84.5 µg/L	100 µg/L	84.5	70.0	130	----
		Trichlorobenzene, 1,2,3-	87-61-6	E611E	80.7 µg/L	100 µg/L	80.7	70.0	130	----
		Trichlorobenzene, 1,2,4-	120-82-1	E611E	80.1 µg/L	100 µg/L	80.1	70.0	130	----
		Trichloroethane, 1,1,1-	71-55-6	E611E	90.3 µg/L	100 µg/L	90.3	70.0	130	----
		Trichloroethane, 1,1,2-	79-00-5	E611E	122 µg/L	100 µg/L	122	70.0	130	----
		Trichloroethylene	79-01-6	E611E	86.9 µg/L	100 µg/L	86.9	70.0	130	----
		Trichlorofluoromethane	75-69-4	E611E	90.1 µg/L	100 µg/L	90.1	60.0	140	----
		Trichloropropane, 1,2,3-	96-18-4	E611E	127 µg/L	100 µg/L	127	70.0	130	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611E	77.9 µg/L	100 µg/L	77.9	70.0	130	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611E	79.8 µg/L	100 µg/L	79.8	70.0	130	----
		Vinyl chloride	75-01-4	E611E	113 µg/L	100 µg/L	113	60.0	140	----

ALS Sample ID: CG2412792-001-E601
 Client Sample ID: MW-01



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34	nC50	
174°C	287°C		481°C	575°C	
346°F	549°F		898°F	1067°F	
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

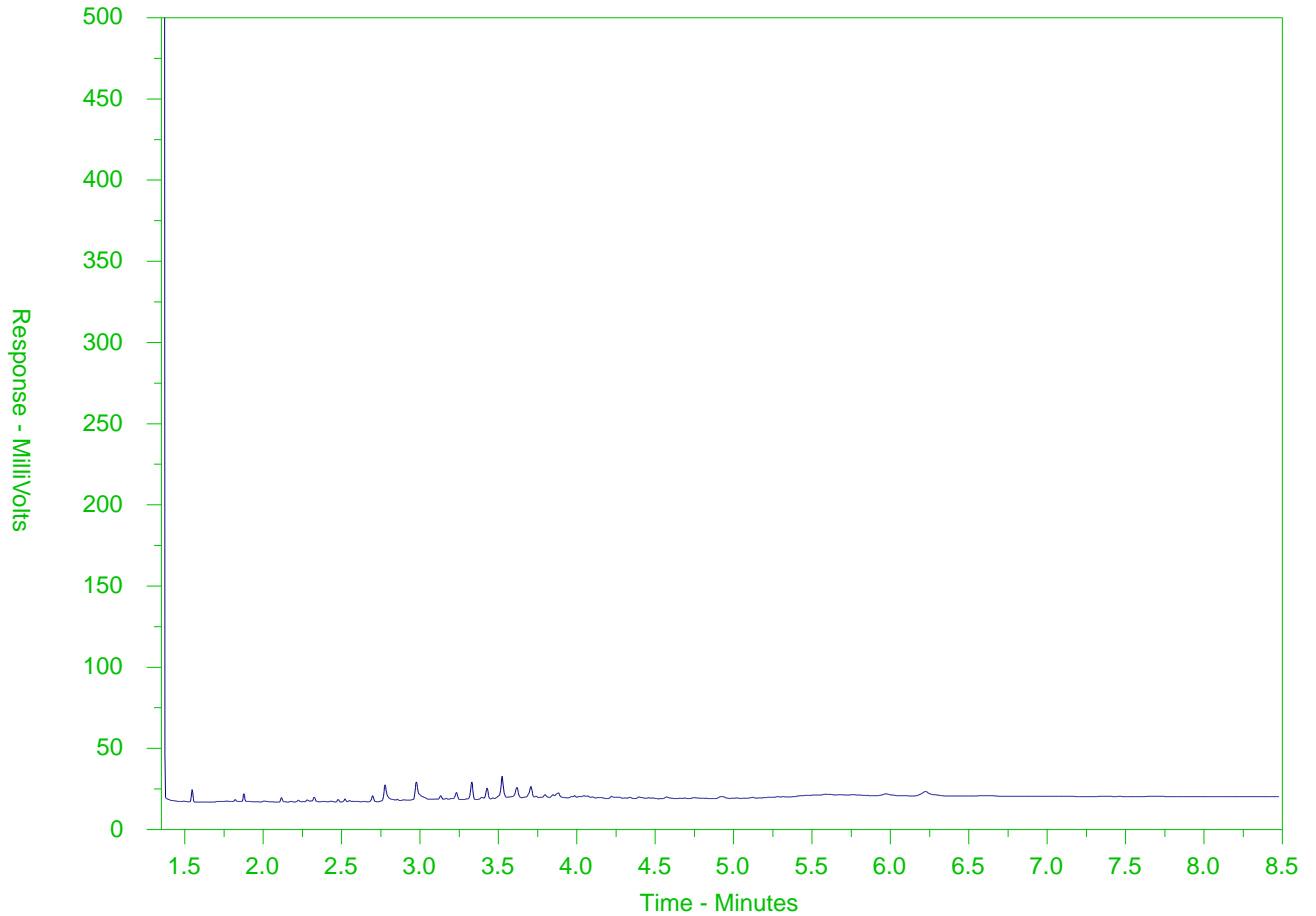
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Sample ID: CG2412792-002-E601
Client Sample ID: MW-04A



F2		F3		F4	
nC10	nC16			nC34	nC50
174°C	287°C			481°C	575°C
346°F	549°F			898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

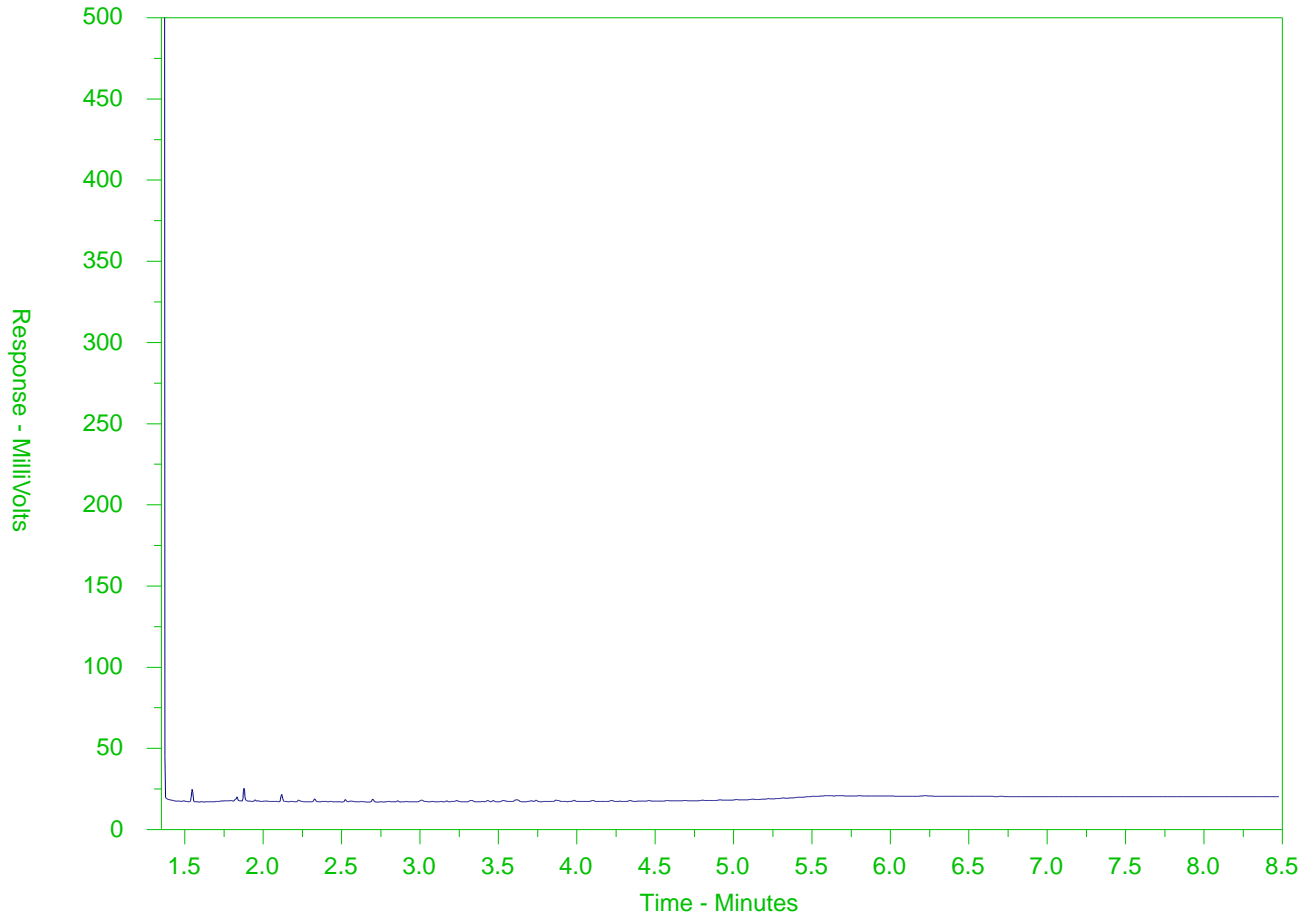
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Sample ID: CG2412792-003-E601
 Client Sample ID: MW-05



← F2 →		← F3 →		← F4 →	
nC10	nC16		nC34		nC50
174°C	287°C		481°C		575°C
346°F	549°F		898°F		1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

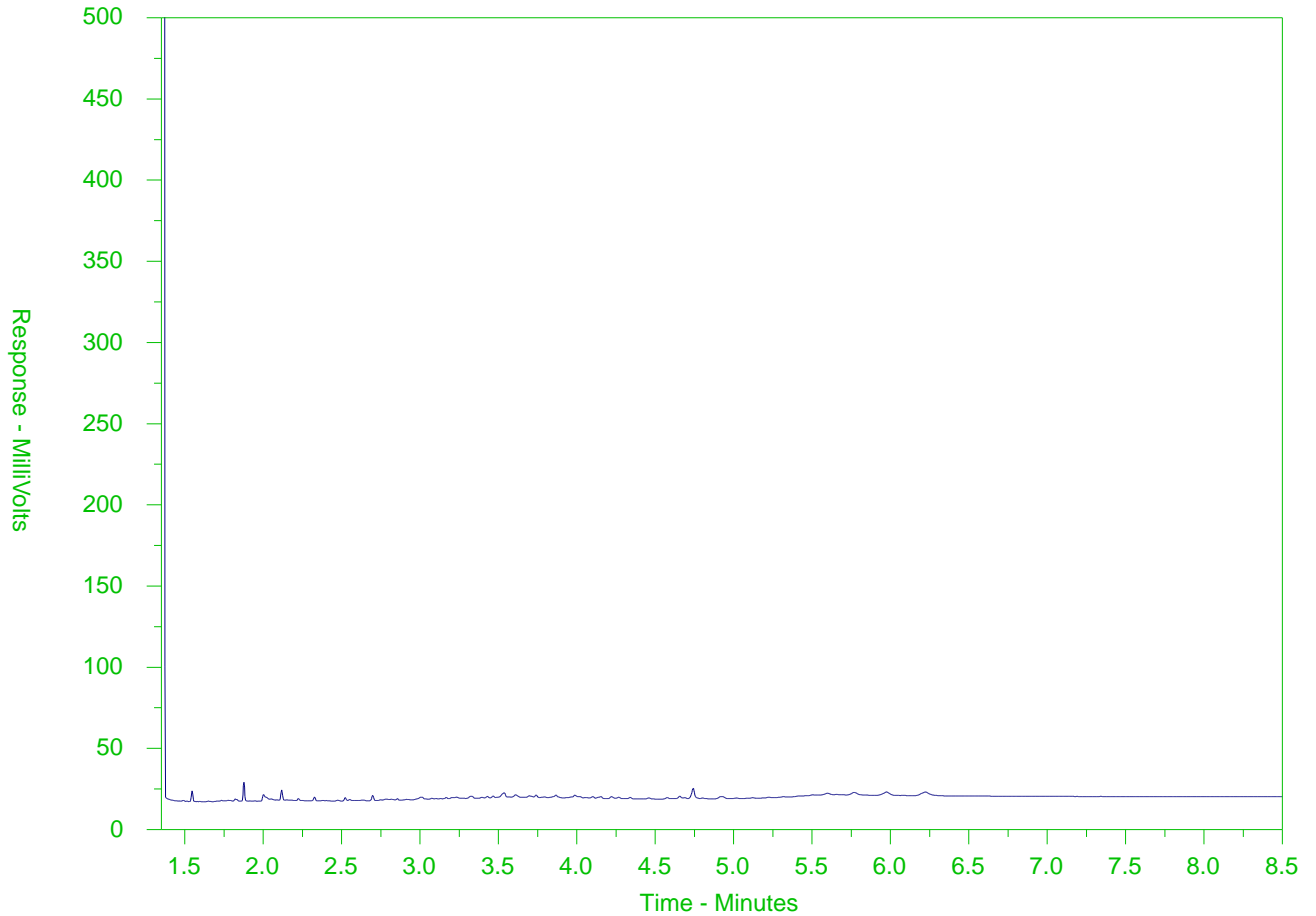
The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Sample ID: CG2412792-004-E601
Client Sample ID: DUPLICATE



F2		F3		F4	
nC10	nC16			nC34	nC50
174°C	287°C			481°C	575°C
346°F	549°F			898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →			
← Diesel/ Jet Fuels →					

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CERTIFICATE OF ANALYSIS

Work Order	: CG2412804-AA		
Amendment	: 1		
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Calgary
Contact	: Darby Madalena	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary Alberta Canada T2C 3G3	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 203 3355	Telephone	: +1 403 407 1800
Project	: SWM.SWOP04071-04.005	Date Samples Received	: 06-Sep-2024 15:00
PO	: SWM.SWOP04071-04.005	Date Analysis Commenced	: 08-Sep-2024
C-O-C number	: CORD RDC PROJECT	Issue Date	: 28-Apr-2025 12:42
Sampler	: WILLEM VERDUYN		
Site	: ----		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
George Huang	Supervisor - Inorganic	Inorganics, Calgary, Alberta
George Huang	Supervisor - Inorganic	Metals, Calgary, Alberta
Gurvinder Kour	Lab Assistant	Metals, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Katarzyna Glinka	Analyst	Inorganics, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Organics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Inorganics, Calgary, Alberta



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	no units
%	percent
meq/L	milliequivalents per litre
mg/L	milligrams per litre
pH units	pH units
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SW-01	SW-02	----	----	----
					Client sampling date / time	07-Sep-2024 17:00	07-Sep-2024 17:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412804-005	CG2412804-006	----	----	----	
					Result	Result	----	----	----	
Physical Tests										
Hardness (as CaCO ₃), dissolved	----	EC100/CG	0.50	mg/L	414	565	----	----	----	
Conductivity	----	E100/CG	2.0	µS/cm	950	1240	----	----	----	
pH	----	E108/CG	0.10	pH units	8.49	8.28	----	----	----	
Alkalinity, bicarbonate (as HCO ₃)	71-52-3	E290/CG	1.0	mg/L	368	537	----	----	----	
Alkalinity, carbonate (as CO ₃)	3812-32-6	E290/CG	1.0	mg/L	8.9	2.8	----	----	----	
Alkalinity, hydroxide (as OH)	14280-30-9	E290/CG	1.0	mg/L	<1.0	<1.0	----	----	----	
Alkalinity, total (as CaCO ₃)	----	E290/CG	2.0	mg/L	317	445	----	----	----	
Solids, total dissolved [TDS], calculated	----	EC103/CG	1.0	mg/L	568	761	----	----	----	
Anions and Nutrients										
Chloride	16887-00-6	E235.Cl/CG	0.50	mg/L	115	141	----	----	----	
Fluoride	16984-48-8	E235.F/CG	0.020	mg/L	0.228	0.187	----	----	----	
Nitrate (as N)	14797-55-8	E235.NO3/CG	0.020	mg/L	0.642	1.64	----	----	----	
Nitrite (as N)	14797-65-0	E235.NO2/CG	0.010	mg/L	<0.050 ^{DLDS}	<0.050 ^{DLDS}	----	----	----	
Sulfate (as SO ₄)	14808-79-8	E235.SO4/CG	0.30	mg/L	60.2	63.3	----	----	----	
Nitrate + Nitrite (as N)	----	EC235.N+N/C G	0.0500	mg/L	0.642	1.64	----	----	----	
Ion Balance										
Anion sum	----	EC101/CG	0.10	meq/L	10.9	14.3	----	----	----	
Cation sum	----	EC101/CG	0.10	meq/L	11.0	14.6	----	----	----	
Ion balance (APHA)	----	EC101/CG	0.01	%	0.46	1.04	----	----	----	
Ion balance (cations/anions)	----	EC101/CG	0.010	%	101	102	----	----	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW-01	SW-02	----	----	----
					Client sampling date / time	07-Sep-2024 17:00	07-Sep-2024 17:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412804-005	CG2412804-006	----	----	----	
					Result	Result	----	----	----	
Total Metals										
Aluminum, total	7429-90-5	E420/CG	0.0030	mg/L	0.0468	0.448	----	----	----	
Antimony, total	7440-36-0	E420/CG	0.00010	mg/L	0.00035	0.00035	----	----	----	
Arsenic, total	7440-38-2	E420/CG	0.00010	mg/L	0.00121	0.00217	----	----	----	
Barium, total	7440-39-3	E420/CG	0.00010	mg/L	0.166	0.277	----	----	----	
Boron, total	7440-42-8	E420/CG	0.010	mg/L	0.088	0.107	----	----	----	
Cadmium, total	7440-43-9	E420/CG	0.0000050	mg/L	0.0000057	0.0000195	----	----	----	
Calcium, total	7440-70-2	E420/CG	0.050	mg/L	74.2	117	----	----	----	
Chromium, total	7440-47-3	E420/CG	0.00050	mg/L	<0.00050	0.00076	----	----	----	
Copper, total	7440-50-8	E420/CG	0.00050	mg/L	0.00148	0.00174	----	----	----	
Iron, total	7439-89-6	E420/CG	0.010	mg/L	0.164	0.950	----	----	----	
Lead, total	7439-92-1	E420/CG	0.000050	mg/L	0.000074	0.000749	----	----	----	
Magnesium, total	7439-95-4	E420/CG	0.0050	mg/L	57.3	72.0	----	----	----	
Manganese, total	7439-96-5	E420/CG	0.00010	mg/L	0.0115	0.152	----	----	----	
Mercury, total	7439-97-6	E508/CG	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----	
Nickel, total	7440-02-0	E420/CG	0.00050	mg/L	0.00232	0.00390	----	----	----	
Potassium, total	7440-09-7	E420/CG	0.050	mg/L	5.58	6.66	----	----	----	
Selenium, total	7782-49-2	E420/CG	0.000050	mg/L	0.000385	0.000527	----	----	----	
Silver, total	7440-22-4	E420/CG	0.000010	mg/L	<0.000010	<0.000010	----	----	----	
Sodium, total	7440-23-5	E420/CG	0.050	mg/L	60.0	72.2	----	----	----	
Uranium, total	7440-61-1	E420/CG	0.000010	mg/L	0.00637	0.00812	----	----	----	
Zinc, total	7440-66-6	E420/CG	0.0030	mg/L	0.0062	0.132	----	----	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW-01	SW-02	----	----	----
					Client sampling date / time	07-Sep-2024 17:00	07-Sep-2024 17:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412804-005	CG2412804-006	----	----	----	
					Result	Result	----	----	----	
Dissolved Metals										
Calcium, dissolved	7440-70-2	E421/CG	0.050	mg/L	71.2	113	----	----	----	
Magnesium, dissolved	7439-95-4	E421/CG	0.0050	mg/L	57.3	68.7	----	----	----	
Manganese, dissolved	7439-96-5	E421/CG	0.00010	mg/L	0.00103	0.0160	----	----	----	
Potassium, dissolved	7440-09-7	E421/CG	0.050	mg/L	5.46	6.58	----	----	----	
Sodium, dissolved	7440-23-5	E421/CG	0.050	mg/L	60.0	71.5	----	----	----	
Dissolved metals filtration location	----	EP421/CG	-	-	Laboratory	Laboratory	----	----	----	
Volatile Organic Compounds										
Benzene	71-43-2	E611A/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Bromobenzene	108-86-1	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Bromochloromethane	74-97-5	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Bromodichloromethane	75-27-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Bromoform	75-25-2	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Bromomethane	74-83-9	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Butylbenzene, n-	104-51-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Butylbenzene, sec-	135-98-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Butylbenzene, tert-	98-06-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Carbon tetrachloride	56-23-5	E611E/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Chlorobenzene	108-90-7	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Chloroethane	75-00-3	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Chloroform	67-66-3	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Chloromethane	74-87-3	E611E/CG	5.0	µg/L	<5.0	<5.0	----	----	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW-01	SW-02	----	----	----
					Client sampling date / time	07-Sep-2024 17:00	07-Sep-2024 17:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412804-005	CG2412804-006	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Chlorotoluene, 2-	95-49-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Chlorotoluene, 4-	106-43-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Cymene, p-	99-87-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dibromochloromethane	124-48-1	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dibromoethane, 1,2-	106-93-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dibromomethane	74-95-3	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichlorobenzene, 1,2-	95-50-1	E611E/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Dichlorobenzene, 1,3-	541-73-1	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichlorobenzene, 1,4-	106-46-7	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichlorodifluoromethane	75-71-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloroethane, 1,1-	75-34-3	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloroethane, 1,2-	107-06-2	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloroethylene, 1,1-	75-35-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloroethylene, cis-1,2-	156-59-2	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloroethylene, trans-1,2-	156-60-5	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloromethane	75-09-2	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloropropane, 1,2-	78-87-5	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloropropane, 1,3-	142-28-9	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloropropane, 2,2-	594-20-7	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloropropylene, 1,1-	563-58-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW-01	SW-02	----	----	----
					Client sampling date / time	07-Sep-2024 17:00	07-Sep-2024 17:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412804-005	CG2412804-006	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Dichloropropylene, cis-1,3-	10061-01-5	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Dichloropropylene, cis+trans-1,3-	542-75-6	E611E/CG	1.5	µg/L	<1.5	<1.5	----	----	----	
Dichloropropylene, trans-1,3-	10061-02-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Ethylbenzene	100-41-4	E611A/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Hexachlorobutadiene	87-68-3	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Isopropylbenzene	98-82-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Propylbenzene, n-	103-65-1	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Styrene	100-42-5	E611E/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Tetrachloroethylene	127-18-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Toluene	108-88-3	E611A/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
Trichlorobenzene, 1,2,3-	87-61-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trichlorobenzene, 1,2,4-	120-82-1	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trichloroethane, 1,1,1-	71-55-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trichloroethane, 1,1,2-	79-00-5	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trichloroethylene	79-01-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trichlorofluoromethane	75-69-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trichloropropane, 1,2,3-	96-18-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trimethylbenzene, 1,2,4-	95-63-6	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	SW-01	SW-02	----	----	----
					Client sampling date / time	07-Sep-2024 17:00	07-Sep-2024 17:30	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	CG2412804-005	CG2412804-006	----	----	----	
					Result	Result	----	----	----	
Volatile Organic Compounds										
Trimethylbenzene, 1,3,5-	108-67-8	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Vinyl chloride	75-01-4	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Xylene, m+p-	179601-23-1	E611A/CG	0.40	µg/L	<0.40	<0.40	----	----	----	
Xylene, o-	95-47-6	E611A/CG	0.30	µg/L	<0.30	<0.30	----	----	----	
Xylenes, total	1330-20-7	E611A/CG	0.50	µg/L	<0.50	<0.50	----	----	----	
BTEX, total	----	E611E/CG	1.0	µg/L	<1.0	<1.0	----	----	----	
Trihalomethanes [THMs], total	----	E611E/CG	2.0	µg/L	<2.0	<2.0	----	----	----	
Hydrocarbons										
F1 (C6-C10)	----	E581.F1/CG	100	µg/L	<100	<100	----	----	----	
F1-BTEX	----	EC580/CG	25	µg/L	<100	<100	----	----	----	
F2 (C10-C16)	----	E601/CG	100	µg/L	<100	<100	----	----	----	
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (F2-F4 surrogate)	392-83-6	E601/CG	1.0	%	91.0	91.4	----	----	----	
Dichlorotoluene, 3,4-	95-75-0	E581.F1/CG	1.0	%	107	112	----	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/CG	1.0	%	70.7	71.7	----	----	----	
Difluorobenzene, 1,4-	540-36-3	E611A/CG	1.0	%	105	102	----	----	----	

Please refer to the General Comments section for an explanation of any result qualifiers detected.

QUALITY CONTROL REPORT

Work Order	: CG2412804-AA	Page	: 1 of 17
Amendment	: 1		
Client	: Tetra Tech Canada Inc.	Laboratory	: ALS Environmental - Calgary
Contact	: Darby Madalena	Account Manager	: Patryk Wojciak
Address	: 110, 140 Quarry Park Blvd SE Calgary AB Canada T2C 3G3	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: 403 203 3355	Telephone	: +1 403 407 1800
Project	: SWM.SWOP04071-04.005	Date Samples Received	: 06-Sep-2024 15:00
PO	: SWM.SWOP04071-04.005	Date Analysis Commenced	: 08-Sep-2024
C-O-C number	: CORD RDC PROJECT	Issue Date	: 28-Apr-2025 12:41
Sampler	: WILLEM VERDUYN		
Site	:		
Quote number	: CG22-EBAE100-0021 City of Red Deer (CORD) Pre-1972 Landfill Sites		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Cynthia Bauer	Organic Supervisor	Calgary Organics, Calgary, Alberta
George Huang	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
George Huang	Supervisor - Inorganic	Calgary Metals, Calgary, Alberta
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Nguyen Tran	Laboratory Analyst	Calgary Organics, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta

Page : 2 of 17
Work Order : CG2412804-AA Amendment 1
Client : Tetra Tech Canada Inc.
Project : SWM.SWOP04071-04.005



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1640300)											
CG2412804-001	Anonymous	pH	----	E108	0.10	pH units	7.85	7.97	1.52%	4%	----
Physical Tests (QC Lot: 1640301)											
CG2412804-001	Anonymous	Conductivity	----	E100	1.0	µS/cm	1180	1190	1.18%	10%	----
Physical Tests (QC Lot: 1640302)											
CG2412804-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	550	556	1.14%	20%	----
Anions and Nutrients (QC Lot: 1639139)											
CG2412803-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1639140)											
CG2412803-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1639142)											
CG2412803-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.068	0.069	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1639143)											
CG2412803-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	16.1	16.2	0.351%	20%	----
Anions and Nutrients (QC Lot: 1639144)											
CG2412803-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	14.2	14.3	0.473%	20%	----
Total Metals (QC Lot: 1642123)											
CG2412718-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 1644761)											
CG2412776-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0060	mg/L	0.264	0.254	3.93%	20%	----
		Antimony, total	7440-36-0	E420	0.00020	mg/L	0.00038	0.00034	0.00004	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00020	mg/L	0.00256	0.00234	8.76%	20%	----
		Barium, total	7440-39-3	E420	0.00020	mg/L	0.0588	0.0558	5.28%	20%	----
		Boron, total	7440-42-8	E420	0.020	mg/L	0.480	0.481	0.159%	20%	----
		Cadmium, total	7440-43-9	E420	0.0000100	mg/L	0.0000559	0.0000632	0.0000073	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.100	mg/L	272	269	1.12%	20%	----
		Chromium, total	7440-47-3	E420	0.00100	mg/L	0.00160	0.00155	0.00004	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00100	mg/L	0.0486	0.0468	3.91%	20%	----
		Iron, total	7439-89-6	E420	0.020	mg/L	1.51	1.41	7.03%	20%	----
		Lead, total	7439-92-1	E420	0.000100	mg/L	0.000479	0.000436	0.000043	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	218	208	4.77%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1644761) - continued											
CG2412776-001	Anonymous	Manganese, total	7439-96-5	E420	0.00020	mg/L	0.221	0.209	5.71%	20%	----
		Nickel, total	7440-02-0	E420	0.00100	mg/L	0.0260	0.0245	5.68%	20%	----
		Potassium, total	7440-09-7	E420	0.100	mg/L	33.0	31.4	5.14%	20%	----
		Selenium, total	7782-49-2	E420	0.000100	mg/L	0.000646	0.000501	0.000146	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000020	mg/L	0.000067	0.000085	0.000018	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.100	mg/L	297	288	2.92%	20%	----
		Uranium, total	7440-61-1	E420	0.000020	mg/L	0.0214	0.0200	7.00%	20%	----
		Zinc, total	7440-66-6	E420	0.0060	mg/L	0.0539	0.0526	0.0013	Diff <2x LOR	----
Dissolved Metals (QC Lot: 1644764)											
CG2412859-001	Anonymous	Calcium, dissolved	7440-70-2	E421	0.050	mg/L	155	157	0.936%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	144	147	2.33%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00063	0.00066	0.00004	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.59	2.64	1.75%	20%	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.58	3.67	2.51%	20%	----
Volatile Organic Compounds (QC Lot: 1639168)											
CG2412804-001	Anonymous	Bromobenzene	108-86-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromochloromethane	74-97-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromodichloromethane	75-27-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromoform	75-25-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Bromomethane	74-83-9	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, n-	104-51-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, sec-	135-98-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, tert-	98-06-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Carbon tetrachloride	56-23-5	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chlorobenzene	108-90-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloroethane	75-00-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chloromethane	74-87-3	E611E	5.0	µg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Chlorotoluene, 2-	95-49-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Chlorotoluene, 4-	106-43-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Cymene, p-	99-87-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromochloromethane	124-48-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Dibromoethane, 1,2-	106-93-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----		



Sub-Matrix: Water

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1639168) - continued											
CG2412804-001	Anonymous	Dibromomethane	74-95-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,3-	541-73-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichlorodifluoromethane	75-71-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethane, 1,1-	75-34-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, 1,1-	75-35-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloroethylene, trans-1,2-	156-60-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloromethane	75-09-2	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,2-	78-87-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 1,3-	142-28-9	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropane, 2,2-	594-20-7	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, 1,1-	563-58-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, cis-1,3-	10061-01-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Hexachlorobutadiene	87-68-3	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Propylbenzene, n-	103-65-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Styrene	100-42-5	E611E	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,3-	87-61-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorobenzene, 1,2,4-	120-82-1	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethane, 1,1,1-	71-55-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethane, 1,1,2-	79-00-5	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichlorofluoromethane	75-69-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trichloropropane, 1,2,3-	96-18-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 1639168) - continued											
CG2412804-001	Anonymous	Vinyl chloride	75-01-4	E611E	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1639170)											
CG2412804-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1639169)											
CG2412804-001	Anonymous	F1 (C6-C10)	----	E581.F1	100	µg/L	<100	<100	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1640301)						
Conductivity	---	E100	1	µS/cm	<1.0	---
Physical Tests (QCLot: 1640302)						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
Anions and Nutrients (QCLot: 1639139)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1639140)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	---
Anions and Nutrients (QCLot: 1639142)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1639143)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	---
Anions and Nutrients (QCLot: 1639144)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Total Metals (QCLot: 1642123)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	---
Total Metals (QCLot: 1644761)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	---
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	---
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	---
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	---
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	---
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	---
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	---
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	---
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	---
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	---
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	---
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1644761) - continued						
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 1644764)						
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Volatile Organic Compounds (QCLot: 1639168)						
Bromobenzene	108-86-1	E611E	1	µg/L	<1.0	----
Bromochloromethane	74-97-5	E611E	1	µg/L	<1.0	----
Bromodichloromethane	75-27-4	E611E	1	µg/L	<1.0	----
Bromoform	75-25-2	E611E	1	µg/L	<1.0	----
Bromomethane	74-83-9	E611E	1	µg/L	<1.0	----
Butylbenzene, n-	104-51-8	E611E	1	µg/L	<1.0	----
Butylbenzene, sec-	135-98-8	E611E	1	µg/L	<1.0	----
Butylbenzene, tert-	98-06-6	E611E	1	µg/L	<1.0	----
Carbon tetrachloride	56-23-5	E611E	0.5	µg/L	<0.50	----
Chlorobenzene	108-90-7	E611E	1	µg/L	<1.0	----
Chloroethane	75-00-3	E611E	1	µg/L	<1.0	----
Chloroform	67-66-3	E611E	1	µg/L	<1.0	----
Chloromethane	74-87-3	E611E	5	µg/L	<5.0	----
Chlorotoluene, 2-	95-49-8	E611E	1	µg/L	<1.0	----
Chlorotoluene, 4-	106-43-4	E611E	1	µg/L	<1.0	----
Cymene, p-	99-87-6	E611E	1	µg/L	<1.0	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1	µg/L	<1.0	----
Dibromochloromethane	124-48-1	E611E	1	µg/L	<1.0	----
Dibromoethane, 1,2-	106-93-4	E611E	1	µg/L	<1.0	----
Dibromomethane	74-95-3	E611E	1	µg/L	<1.0	----
Dichlorobenzene, 1,2-	95-50-1	E611E	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,3-	541-73-1	E611E	1	µg/L	<1.0	----
Dichlorobenzene, 1,4-	106-46-7	E611E	1	µg/L	<1.0	----
Dichlorodifluoromethane	75-71-8	E611E	1	µg/L	<1.0	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1639168) - continued						
Dichloroethane, 1,1-	75-34-3	E611E	1	µg/L	<1.0	----
Dichloroethane, 1,2-	107-06-2	E611E	1	µg/L	<1.0	----
Dichloroethylene, 1,1-	75-35-4	E611E	1	µg/L	<1.0	----
Dichloroethylene, cis-1,2-	156-59-2	E611E	1	µg/L	<1.0	----
Dichloroethylene, trans-1,2-	156-60-5	E611E	1	µg/L	<1.0	----
Dichloromethane	75-09-2	E611E	1	µg/L	<1.0	----
Dichloropropane, 1,2-	78-87-5	E611E	1	µg/L	<1.0	----
Dichloropropane, 1,3-	142-28-9	E611E	1	µg/L	<1.0	----
Dichloropropane, 2,2-	594-20-7	E611E	1	µg/L	<1.0	----
Dichloropropylene, 1,1-	563-58-6	E611E	1	µg/L	<1.0	----
Dichloropropylene, cis-1,3-	10061-01-5	E611E	1	µg/L	<1.0	----
Dichloropropylene, trans-1,3-	10061-02-6	E611E	1	µg/L	<1.0	----
Hexachlorobutadiene	87-68-3	E611E	1	µg/L	<1.0	----
Isopropylbenzene	98-82-8	E611E	1	µg/L	<1.0	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.5	µg/L	<0.50	----
Propylbenzene, n-	103-65-1	E611E	1	µg/L	<1.0	----
Styrene	100-42-5	E611E	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1	µg/L	<1.0	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1	µg/L	<1.0	----
Tetrachloroethylene	127-18-4	E611E	1	µg/L	<1.0	----
Trichlorobenzene, 1,2,3-	87-61-6	E611E	1	µg/L	<1.0	----
Trichlorobenzene, 1,2,4-	120-82-1	E611E	1	µg/L	<1.0	----
Trichloroethane, 1,1,1-	71-55-6	E611E	1	µg/L	<1.0	----
Trichloroethane, 1,1,2-	79-00-5	E611E	1	µg/L	<1.0	----
Trichloroethylene	79-01-6	E611E	1	µg/L	<1.0	----
Trichlorofluoromethane	75-69-4	E611E	1	µg/L	<1.0	----
Trichloropropane, 1,2,3-	96-18-4	E611E	1	µg/L	<1.0	----
Trimethylbenzene, 1,2,4-	95-63-6	E611E	1	µg/L	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E611E	1	µg/L	<1.0	----
Vinyl chloride	75-01-4	E611E	1	µg/L	<1.0	----
Volatile Organic Compounds (QCLot: 1639170)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----



Sub-Matrix: **Water**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
Volatile Organic Compounds (QCLot: 1639170) - continued						
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1639169)						
F1 (C6-C10)	----	E581.F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1640673)						
F2 (C10-C16)	----	E601	100	µg/L	<100	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1640300)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 1640301)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	99.2	90.0	110	----
Physical Tests (QCLot: 1640302)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	95.3	85.0	115	----
Anions and Nutrients (QCLot: 1639139)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	98.5	90.0	110	----
Anions and Nutrients (QCLot: 1639140)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 1639142)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.2	90.0	110	----
Anions and Nutrients (QCLot: 1639143)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.2	90.0	110	----
Anions and Nutrients (QCLot: 1639144)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.9	90.0	110	----
Total Metals (QCLot: 1642123)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	111	80.0	120	----
Total Metals (QCLot: 1644761)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.4	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.4	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.0	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.8	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	115	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1644761) - continued									
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.4	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	95.4	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	91.7	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.5	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	99.5	80.0	120	----
Dissolved Metals (QCLot: 1644764)									
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	101	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.8	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Volatile Organic Compounds (QCLot: 1639168)									
Bromobenzene	108-86-1	E611E	1	µg/L	100 µg/L	90.8	70.0	130	----
Bromochloromethane	74-97-5	E611E	1	µg/L	100 µg/L	99.2	70.0	130	----
Bromodichloromethane	75-27-4	E611E	1	µg/L	100 µg/L	109	70.0	130	----
Bromoform	75-25-2	E611E	1	µg/L	100 µg/L	87.3	70.0	130	----
Bromomethane	74-83-9	E611E	1	µg/L	100 µg/L	109	60.0	140	----
Butylbenzene, n-	104-51-8	E611E	1	µg/L	100 µg/L	86.0	70.0	130	----
Butylbenzene, sec-	135-98-8	E611E	1	µg/L	100 µg/L	75.5	70.0	130	----
Butylbenzene, tert-	98-06-6	E611E	1	µg/L	100 µg/L	70.2	70.0	130	----
Carbon tetrachloride	56-23-5	E611E	0.5	µg/L	100 µg/L	70.8	70.0	130	----
Chlorobenzene	108-90-7	E611E	1	µg/L	100 µg/L	109	70.0	130	----
Chloroethane	75-00-3	E611E	1	µg/L	100 µg/L	87.0	60.0	140	----
Chloroform	67-66-3	E611E	1	µg/L	100 µg/L	100	70.0	130	----
Chloromethane	74-87-3	E611E	5	µg/L	100 µg/L	94.6	60.0	140	----
Chlorotoluene, 2-	95-49-8	E611E	1	µg/L	100 µg/L	86.2	70.0	130	----
Chlorotoluene, 4-	106-43-4	E611E	1	µg/L	100 µg/L	85.2	70.0	130	----
Cymene, p-	99-87-6	E611E	1	µg/L	100 µg/L	70.9	70.0	130	----
Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	1	µg/L	100 µg/L	109	70.0	130	----
Dibromochloromethane	124-48-1	E611E	1	µg/L	100 µg/L	98.3	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611E	1	µg/L	100 µg/L	120	70.0	130	----



Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike		Recovery (%)		Recovery Limits (%)		Qualifier
					Target Concentration	LCS	Low	High			
Volatile Organic Compounds (QCLot: 1639168) - continued											
Dibromomethane	74-95-3	E611E	1	µg/L	100 µg/L	99.3	70.0	130	130	----	
Dichlorobenzene, 1,2-	95-50-1	E611E	0.5	µg/L	100 µg/L	89.9	70.0	130	130	----	
Dichlorobenzene, 1,3-	541-73-1	E611E	1	µg/L	100 µg/L	83.4	70.0	130	130	----	
Dichlorobenzene, 1,4-	106-46-7	E611E	1	µg/L	100 µg/L	85.8	70.0	130	130	----	
Dichlorodifluoromethane	75-71-8	E611E	1	µg/L	100 µg/L	98.4	60.0	140	140	----	
Dichloroethane, 1,1-	75-34-3	E611E	1	µg/L	100 µg/L	104	70.0	130	130	----	
Dichloroethane, 1,2-	107-06-2	E611E	1	µg/L	100 µg/L	129	70.0	130	130	----	
Dichloroethylene, 1,1-	75-35-4	E611E	1	µg/L	100 µg/L	87.9	70.0	130	130	----	
Dichloroethylene, cis-1,2-	156-59-2	E611E	1	µg/L	100 µg/L	112	70.0	130	130	----	
Dichloroethylene, trans-1,2-	156-60-5	E611E	1	µg/L	100 µg/L	96.1	70.0	130	130	----	
Dichloromethane	75-09-2	E611E	1	µg/L	100 µg/L	114	70.0	130	130	----	
Dichloropropane, 1,2-	78-87-5	E611E	1	µg/L	100 µg/L	112	70.0	130	130	----	
Dichloropropane, 1,3-	142-28-9	E611E	1	µg/L	100 µg/L	127	70.0	130	130	----	
Dichloropropane, 2,2-	594-20-7	E611E	1	µg/L	100 µg/L	75.6	70.0	130	130	----	
Dichloropropylene, 1,1-	563-58-6	E611E	1	µg/L	100 µg/L	81.1	70.0	130	130	----	
Dichloropropylene, cis-1,3-	10061-01-5	E611E	1	µg/L	100 µg/L	95.0	70.0	130	130	----	
Dichloropropylene, trans-1,3-	10061-02-6	E611E	1	µg/L	100 µg/L	94.2	70.0	130	130	----	
Hexachlorobutadiene	87-68-3	E611E	1	µg/L	100 µg/L	89.9	70.0	130	130	----	
Isopropylbenzene	98-82-8	E611E	1	µg/L	100 µg/L	83.4	70.0	130	130	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	0.5	µg/L	100 µg/L	100	70.0	130	130	----	
Propylbenzene, n-	103-65-1	E611E	1	µg/L	100 µg/L	72.9	70.0	130	130	----	
Styrene	100-42-5	E611E	0.5	µg/L	100 µg/L	88.7	70.0	130	130	----	
Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	1	µg/L	100 µg/L	90.0	70.0	130	130	----	
Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	1	µg/L	100 µg/L	127	70.0	130	130	----	
Tetrachloroethylene	127-18-4	E611E	1	µg/L	100 µg/L	73.6	70.0	130	130	----	
Trichlorobenzene, 1,2,3-	87-61-6	E611E	1	µg/L	100 µg/L	71.3	70.0	130	130	----	
Trichlorobenzene, 1,2,4-	120-82-1	E611E	1	µg/L	100 µg/L	86.2	70.0	130	130	----	
Trichloroethane, 1,1,1-	71-55-6	E611E	1	µg/L	100 µg/L	73.9	70.0	130	130	----	
Trichloroethane, 1,1,2-	79-00-5	E611E	1	µg/L	100 µg/L	121	70.0	130	130	----	
Trichloroethylene	79-01-6	E611E	1	µg/L	100 µg/L	71.2	70.0	130	130	----	
Trichlorofluoromethane	75-69-4	E611E	1	µg/L	100 µg/L	85.3	60.0	140	140	----	
Trichloropropane, 1,2,3-	96-18-4	E611E	1	µg/L	100 µg/L	121	70.0	130	130	----	
Trimethylbenzene, 1,2,4-	95-63-6	E611E	1	µg/L	100 µg/L	79.9	70.0	130	130	----	
Trimethylbenzene, 1,3,5-	108-67-8	E611E	1	µg/L	100 µg/L	80.4	70.0	130	130	----	
Vinyl chloride	75-01-4	E611E	1	µg/L	100 µg/L	86.4	60.0	140	140	----	

Volatile Organic Compounds (QCLot: 1639170)



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1639170) - continued									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	95.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	73.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	83.1	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	86.0	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	79.3	70.0	130	----
Hydrocarbons (QCLot: 1639169)									
F1 (C6-C10)	----	E581.F1	100	µg/L	2480 µg/L	108	70.0	130	----
Hydrocarbons (QCLot: 1640673)									
F2 (C10-C16)	----	E601	100	µg/L	3830 µg/L	89.6	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1639139)										
CG2412803-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	2.48 mg/L	2.5 mg/L	99.3	75.0	125	----
Anions and Nutrients (QCLot: 1639140)										
CG2412803-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.496 mg/L	0.5 mg/L	99.2	75.0	125	----
Anions and Nutrients (QCLot: 1639142)										
CG2412803-002	Anonymous	Fluoride	16984-48-8	E235.F	0.981 mg/L	1 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 1639143)										
CG2412803-002	Anonymous	Chloride	16887-00-6	E235.Cl	98.8 mg/L	100 mg/L	98.8	75.0	125	----
Anions and Nutrients (QCLot: 1639144)										
CG2412803-002	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	98.2 mg/L	100 mg/L	98.2	75.0	125	----
Total Metals (QCLot: 1642123)										
CG2412718-002	Anonymous	Mercury, total	7439-97-6	E508	0.000105 mg/L	0 mg/L	105	70.0	130	----
Total Metals (QCLot: 1644761)										
CG2412779-005	Anonymous	Aluminum, total	7429-90-5	E420	2.00 mg/L	2 mg/L	100	70.0	130	----
		Antimony, total	7440-36-0	E420	0.192 mg/L	0.2 mg/L	96.1	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.192 mg/L	0.2 mg/L	96.3	70.0	130	----
		Barium, total	7440-39-3	E420	0.194 mg/L	0.2 mg/L	97.0	70.0	130	----
		Boron, total	7440-42-8	E420	1.04 mg/L	1 mg/L	104	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.0398 mg/L	0.04 mg/L	99.6	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----
		Chromium, total	7440-47-3	E420	0.390 mg/L	0.4 mg/L	97.6	70.0	130	----
		Copper, total	7440-50-8	E420	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		Iron, total	7439-89-6	E420	19.3 mg/L	20 mg/L	96.5	70.0	130	----
		Lead, total	7439-92-1	E420	0.187 mg/L	0.2 mg/L	93.7	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	----	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.191 mg/L	0.2 mg/L	95.7	70.0	130	----
		Nickel, total	7440-02-0	E420	0.387 mg/L	0.4 mg/L	96.9	70.0	130	----
		Potassium, total	7440-09-7	E420	38.0 mg/L	40 mg/L	95.1	70.0	130	----
		Selenium, total	7782-49-2	E420	0.377 mg/L	0.4 mg/L	94.2	70.0	130	----
		Silver, total	7440-22-4	E420	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		Sodium, total	7440-23-5	E420	18.8 mg/L	20 mg/L	94.0	70.0	130	----
		Uranium, total	7440-61-1	E420	0.0377 mg/L	0.04 mg/L	94.2	70.0	130	----
		Zinc, total	7440-66-6	E420	3.94 mg/L	4 mg/L	98.5	70.0	130	----
Dissolved Metals (QCLot: 1644764)										
CG2412859-002	Anonymous	Calcium, dissolved	7440-70-2	E421	41.9 mg/L	40 mg/L	105	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	9.93 mg/L	10 mg/L	99.3	70.0	130	----



Sub-Matrix: Water

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1644764) - continued										
CG2412859-002	Anonymous	Manganese, dissolved	7439-96-5	E421	0.199 mg/L	0.2 mg/L	99.3	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	40.6 mg/L	40 mg/L	101	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	21.0 mg/L	20 mg/L	105	70.0	130	----
Volatile Organic Compounds (QCLot: 1639168)										
CG2412804-001	Anonymous	Bromobenzene	108-86-1	E611E	103 µg/L	100 µg/L	103	70.0	130	----
		Bromochloromethane	74-97-5	E611E	114 µg/L	100 µg/L	114	70.0	130	----
		Bromodichloromethane	75-27-4	E611E	125 µg/L	100 µg/L	125	70.0	130	----
		Bromoform	75-25-2	E611E	98.1 µg/L	100 µg/L	98.1	70.0	130	----
		Bromomethane	74-83-9	E611E	126 µg/L	100 µg/L	126	60.0	140	----
		Butylbenzene, n-	104-51-8	E611E	76.8 µg/L	100 µg/L	76.8	70.0	130	----
		Butylbenzene, sec-	135-98-8	E611E	78.1 µg/L	100 µg/L	78.1	70.0	130	----
		Butylbenzene, tert-	98-06-6	E611E	80.7 µg/L	100 µg/L	80.7	70.0	130	----
		Carbon tetrachloride	56-23-5	E611E	74.0 µg/L	100 µg/L	74.0	70.0	130	----
		Chlorobenzene	108-90-7	E611E	128 µg/L	100 µg/L	128	70.0	130	----
		Chloroethane	75-00-3	E611E	102 µg/L	100 µg/L	102	60.0	140	----
		Chloroform	67-66-3	E611E	116 µg/L	100 µg/L	116	70.0	130	----
		Chloromethane	74-87-3	E611E	110 µg/L	100 µg/L	110	60.0	140	----
		Chlorotoluene, 2-	95-49-8	E611E	99.1 µg/L	100 µg/L	99.1	70.0	130	----
		Chlorotoluene, 4-	106-43-4	E611E	98.1 µg/L	100 µg/L	98.1	70.0	130	----
		Cymene, p-	99-87-6	E611E	82.3 µg/L	100 µg/L	82.3	70.0	130	----
		Dibromo-3-chloropropane, 1,2-	96-12-8	E611E	122 µg/L	100 µg/L	122	70.0	130	----
		Dibromochloromethane	124-48-1	E611E	113 µg/L	100 µg/L	113	70.0	130	----
		Dibromoethane, 1,2-	106-93-4	E611E	128 µg/L	100 µg/L	128	70.0	130	----
		Dibromomethane	74-95-3	E611E	114 µg/L	100 µg/L	114	70.0	130	----
		Dichlorobenzene, 1,2-	95-50-1	E611E	104 µg/L	100 µg/L	104	70.0	130	----
		Dichlorobenzene, 1,3-	541-73-1	E611E	96.0 µg/L	100 µg/L	96.0	70.0	130	----
		Dichlorobenzene, 1,4-	106-46-7	E611E	98.4 µg/L	100 µg/L	98.4	70.0	130	----
		Dichlorodifluoromethane	75-71-8	E611E	113 µg/L	100 µg/L	113	60.0	140	----
		Dichloroethane, 1,1-	75-34-3	E611E	121 µg/L	100 µg/L	121	70.0	130	----
		Dichloroethane, 1,2-	107-06-2	E611E	122 µg/L	100 µg/L	122	70.0	130	----
		Dichloroethylene, 1,1-	75-35-4	E611E	103 µg/L	100 µg/L	103	70.0	130	----
		Dichloroethylene, cis-1,2-	156-59-2	E611E	126 µg/L	100 µg/L	126	70.0	130	----
		Dichloroethylene, trans-1,2-	156-60-5	E611E	111 µg/L	100 µg/L	111	70.0	130	----
		Dichloromethane	75-09-2	E611E	127 µg/L	100 µg/L	127	70.0	130	----
		Dichloropropane, 1,2-	78-87-5	E611E	121 µg/L	100 µg/L	121	70.0	130	----
		Dichloropropane, 1,3-	142-28-9	E611E	129 µg/L	100 µg/L	129	70.0	130	----
		Dichloropropane, 2,2-	594-20-7	E611E	80.3 µg/L	100 µg/L	80.3	70.0	130	----
Dichloropropylene, 1,1-	563-58-6	E611E	95.8 µg/L	100 µg/L	95.8	70.0	130	----		
Dichloropropylene, cis-1,3-	10061-01-5	E611E	109 µg/L	100 µg/L	109	70.0	130	----		
Dichloropropylene, trans-1,3-	10061-02-6	E611E	107 µg/L	100 µg/L	107	70.0	130	----		
Hexachlorobutadiene	87-68-3	E611E	82.7 µg/L	100 µg/L	82.7	70.0	130	----		
Isopropylbenzene	98-82-8	E611E	97.7 µg/L	100 µg/L	97.7	70.0	130	----		
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611E	111 µg/L	100 µg/L	111	70.0	130	----		
Propylbenzene, n-	103-65-1	E611E	86.3 µg/L	100 µg/L	86.3	70.0	130	----		



Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	
Volatile Organic Compounds (QCLot: 1639168) - continued										
CG2412804-001	Anonymous	Styrene	100-42-5	E611E	102 µg/L	100 µg/L	102	70.0	130	----
		Tetrachloroethane, 1,1,1,2-	630-20-6	E611E	105 µg/L	100 µg/L	105	70.0	130	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611E	128 µg/L	100 µg/L	128	70.0	130	----
		Tetrachloroethylene	127-18-4	E611E	76.7 µg/L	100 µg/L	76.7	70.0	130	----
		Trichlorobenzene, 1,2,3-	87-61-6	E611E	83.9 µg/L	100 µg/L	83.9	70.0	130	----
		Trichlorobenzene, 1,2,4-	120-82-1	E611E	74.7 µg/L	100 µg/L	74.7	70.0	130	----
		Trichloroethane, 1,1,1-	71-55-6	E611E	87.0 µg/L	100 µg/L	87.0	70.0	130	----
		Trichloroethane, 1,1,2-	79-00-5	E611E	122 µg/L	100 µg/L	122	70.0	130	----
		Trichloroethylene	79-01-6	E611E	83.1 µg/L	100 µg/L	83.1	70.0	130	----
		Trichlorofluoromethane	75-69-4	E611E	81.7 µg/L	100 µg/L	81.7	60.0	140	----
		Trichloropropane, 1,2,3-	96-18-4	E611E	125 µg/L	100 µg/L	125	70.0	130	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611E	79.7 µg/L	100 µg/L	79.7	70.0	130	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611E	79.7 µg/L	100 µg/L	79.7	70.0	130	----
		Vinyl chloride	75-01-4	E611E	107 µg/L	100 µg/L	107	60.0	140	----
Volatile Organic Compounds (QCLot: 1639170)										
CG2412804-001	Anonymous	Benzene	71-43-2	E611A	113 µg/L	100 µg/L	113	70.0	130	----
		Ethylbenzene	100-41-4	E611A	86.1 µg/L	100 µg/L	86.1	70.0	130	----
		Toluene	108-88-3	E611A	98.1 µg/L	100 µg/L	98.1	70.0	130	----
		Xylene, m+p-	179601-23-1	E611A	201 µg/L	200 µg/L	100	70.0	130	----
		Xylene, o-	95-47-6	E611A	93.0 µg/L	100 µg/L	93.0	70.0	130	----



RDC project

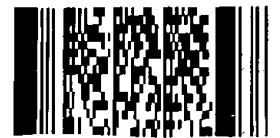
Report to:		Report Format / Distribution		Service Requested:								
Company: Tetra Tech Canada Inc.		<input type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="checkbox"/> Regular Service (Default)								
Contact: Darby Madalena		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax		<input type="checkbox"/> Rush Service (2-3 Days)								
Address: 110, 140 Quarry Park Blvd SE, Calgary, AB T2C 3G3		Email 1: darby.madalena@ttratech.com		<input type="checkbox"/> Priority Service (1 Day or ASAP)								
Phone: 403-723-6867 Fax: 403-203-3301		Email 2:		<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS								
Invoice To: <input checked="" type="checkbox"/> Same as Report		ALS Digital Crosstab results		Analysis Request								
Company: SAME AS REPORT		Indicate Bottles: Filtered / Preserved (F/P) →→										
Contact:		Client / Project Information:										
Address:		Job #: SWM.SWOP04071-04.005										
Sample:		PO/AFE: SWM.SWOP04071-04.005										
Phone: Fax:		Legal Site Description:										
Lab Work Order # (lab use only)		Quote #: CG22-EBAE100-0021										
ALS Contact: Milica Papic		Sampler (Initials): <i>William Verdugo</i>										
Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Time hh:mm	Sample Type (Select from drop-down list)	SS421B - Routine + Diss Meta	E611E - VOCs	S665A.F (BTEX, F1 and F2)	Total Metals	Routine	Hazardous?	Highly Contaminated?	Number of Containers
	MW-05	05-09-24	15:20	Water	X	X	X					1
	21MW-08		15:50	Water	X	X	X					1
	21MW-09		16:10	Water	X	X	X					1
	Duplicate			Water	X							1
	SW-01 Downstream (not field filtered)		17:00	Water		X	X	X	X			1
	SW-02 Upstream (not field filtered)		17:30	Water		X	X	X	X			1
Guidelines / Regulations					Special Instructions / Hazardous Details							

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.

Relinquished By: <i>William Verdugo</i>	Date & Time: 13:30	Received By: <i>[Signature]</i>	Date & Time: 9/26/24 15:00	Temperature: 9.8	Sample Condition (lab use only):
Relinquished By:	Date & Time:	Received By:	Date & Time:		Samples Received in Good Condition? Y / N (if no provided details)

Environmental Division
Calgary
Work Order Reference
CG2412804



RDC project

APPENDIX E

HISTORICAL ANALYTICAL REPORTS

Table 1
Elevations for Soil Vapour and Groundwater Monitoring Wells

Test Location	Well Depth (m)	Elevations				Screen Length (m)
		Ground (m)	Top of Pipe (m)	Screen Interval		
				Bottom	Top	
MW-01	6.1	874.014	875.099	867.914	872.514	4.6
MW-02	6.6	877.302	878.096	870.702	--	--
MW-03	5.1	877.297	877.307	872.197	--	--
VW-01	3.5	874.194	874.943	870.694	870.994	0.3
VW-02	4.6	877.321	878.166	872.721	873.021	0.3
VW-03	4.0	877.316	878.017	873.316	873.616	0.3
TH-03	No Well	875.332	--	--	--	--
TH-05	No Well	875.567	--	--	--	--
TH-06	No Well	876.597	--	--	--	--
TH-07	No Well	876.925	--	--	--	--
TH-08	No Well	876.812	--	--	--	--
TH-09	No Well	875.907	--	--	--	--

Notes:

- 1) Geodetic elevations are referenced to multiple ASCM Nos. 269191, 376673 and 384792.
- 2) MW - Monitoring Well.
- 3) VW - Soil Vapour Well.
- 4) TH - Testhole.
- 5) Well depth, screen interval derived from borehole logs by others, where available.
- 6) -- No value established.

Table 2
Site Monitoring Results

Test Location	Elevations		Groundwater Elevation (m)		Headspace Vapour			
	Ground (m)	Top of Pipe (m)	03/08/13		03/08/13		Combustible	Volatile
			03/08/13		Combustible	Volatile		
MW-01	874.014	875.099	869.841		230	43		
MW-02	877.302	878.096	874.276		ND	ND		
MW-03	877.297	877.307	NM		NM	NM		
VW-01	874.194	874.943	--	--	1,600	64		
VW-02	877.321	878.166	--	--	20	2		
VW-03	877.316	878.017	--	--	25	ND		
TH-03	875.332	NA	--	--	--	--	--	--
TH-05	875.567	NA	--	--	--	--	--	--
TH-06	876.597	NA	--	--	--	--	--	--
TH-07	876.925	NA	--	--	--	--	--	--
TH-08	876.812	NA	--	--	--	--	--	--
TH-09	875.907	NA	--	--	--	--	--	--

Notes:

- 1) Geodetic elevations are referenced to multiple ASCM Nos 269191, 376673 and 384792.
- 2) Measurement of combustible and volatile vapours by RKI Eagle 2. Units ppmv.
Combustible vapour sensor calibrated to hexane and photoionization detector calibrated to isobutylene.
- 3) NA - Not Applicable.
- 4) ND - Not Detected, less than the limit of instrument detection.
- 5) NM - Not Measured.
- 6) -- No applicable value.

Table 3A
Analytical Results - Soil - Drill Cuttings (Soil Bag)

Parameter	Detection Limit	Soil Bag	Class II Landfill
		1 of 1	Acceptance Criteria
pH	0.10	7.71	2-12.5
Flash Point (°C)	30.0	>75	>61
Paint Filter Test	-	PASS	PASS
<u>TCLP Hydrocarbons</u>			
Benzene	0.0050	ND	0.5
Toluene	0.0050	ND	0.5
Ethylbenzene	0.0050	ND	0.5
Xylenes	0.0050	ND	0.5
<u>TCLP Metals</u>			
Antimony (Sb)	5.0	ND	500
Arsenic (As)	0.20	ND	5
Barium (Ba)	5.0	ND	100
Beryllium (Be)	0.50	ND	5
Boron (B)	5.0	ND	500
Cadmium (Cd)	0.050	ND	1
Chromium (Cr)	0.50	ND	5
Cobalt (Co)	5.0	ND	100
Copper (Cu)	5.0	ND	100
Iron (Fe)	5.0	ND	1,000
Lead (Pb)	0.50	ND	5
Mercury (Hg)	0.010	ND	0.2
Nickel (Ni)	0.50	ND	5
Selenium (Se)	0.20	ND	1
Silver (Ag)	0.50	ND	5
Thallium (Tl)	0.50	ND	5
Uranium (U)	1.0	ND	2
Vanadium (V)	5.0	ND	100
Zinc (Zn)	5.0	ND	500
Zirconium (Zr)	5.0	ND	500

Notes:

- 1) Applicable waste screening process for The City of Red Deer Class II Waste Management Facility.
- 2) Class II Landfill Acceptable Criteria - per Table 2, Part 4 Schedule to the Alberta User Guide for Waste Managers 3/95.
- 3) All units are mg/L unless otherwise stated.
- 4) ND - Not Detected
- 5) Soil Bags were sampled June 26, 2013.
- 6) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 3B
Analytical Results - Soil - General Indices and Heavy Metals

Parameters	Units	Detection Limit	TH-01	Tier 1
			@ 5.2 m	Guideline
			06/26/2013	
Chloride (Cl)	mg/kg	15	188	--
Nitrate-N	mg/kg	0.74	ND	--
Nitrite-N	mg/kg	0.74	ND	--
<u>Metals</u>				
Antimony (Sb)	mg/kg	0.20	0.44	20
Arsenic (As)	mg/kg	0.20	7.18	17
Barium (Ba)	mg/kg	5.0	242	500
Beryllium (Be)	mg/kg	1.0	ND	5
Cadmium (Cd)	mg/kg	0.50	ND	10
Chromium (Cr)	mg/kg	0.50	35.7	64
Cobalt (Co)	mg/kg	1.0	7.8	20
Copper (Cu)	mg/kg	2.0	18.3	63
Lead (Pb)	mg/kg	5.0	8.0	140
Mercury (Hg)	mg/kg	0.05	ND	6.6
Molybdenum (Mo)	mg/kg	1.0	1.2	4
Nickel (Ni)	mg/kg	2.0	28.6	50
Selenium (Se)	mg/kg	0.50	ND	1.0
Silver (Ag)	mg/kg	1.0	ND	20
Thallium (Tl)	mg/kg	0.5	ND	1.0
Tin (Sn)	mg/kg	2.0	ND	5
Uranium (U)	mg/kg	2.0	ND	23
Vanadium (V)	mg/kg	1.0	38.4	130
Zinc (Zn)	mg/kg	10	63	200
Hexavalent Chromium	mg/kg	0.10	ND	0.4
Boron (B), Hot Water Ext.	mg/kg	0.10	1.26	2

Notes:

- 1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
- 2) ND - Not Detected, less than the limit of method detection.
- 3) -- No value established in the referenced criteria.
- 4) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guidelines.
- 5) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 3C
Analytical Results - Soil - VOCs

Parameters	Units	Detection Limit	TH-01	Tier 1
			@ 5.2 m 06/26/2013	Guideline
Hydrocarbons				
F1 (C ₆ -C ₁₀)	mg/kg	10	ND	24
F2 (C ₁₀ -C ₁₆)	mg/kg	25	ND	130
F3 (C ₁₆ -C ₃₄)	mg/kg	50	117	300
F4 (C ₃₄ -C ₅₀)	mg/kg	50	ND	2,800
Total Hydrocarbons (C ₆ -C ₅₀)	mg/kg	50	117	--
Volatile Organic Compounds				
Benzene	mg/kg	0.0050	ND	0.073
Bromobenzene	mg/kg	0.010	ND	--
Bromochloromethane	mg/kg	0.010	ND	--
Bromodichloromethane	mg/kg	0.010	ND	--
Bromoform	mg/kg	0.010	ND	--
Bromomethane	mg/kg	0.10	ND	--
n-Butylbenzene	mg/kg	0.010	ND	--
sec-Butylbenzene	mg/kg	0.010	ND	--
tert-Butylbenzene	mg/kg	0.010	ND	--
Carbon tetrachloride	mg/kg	0.010	ND	0.00056
Chlorobenzene	mg/kg	0.010	ND	0.018
Dibromochloromethane	mg/kg	0.010	ND	0.27
Chloroethane	mg/kg	0.10	ND	--
Chloroform	mg/kg	0.010	ND	0.0010
Chloromethane	mg/kg	0.10	ND	--
2-Chlorotoluene	mg/kg	0.010	ND	--
4-Chlorotoluene	mg/kg	0.010	ND	--
1,2-Dibromo-3-chloropropane	mg/kg	0.010	ND	--
1,2-Dibromoethane	mg/kg	0.010	ND	--
Dibromomethane	mg/kg	0.010	ND	--
1,2-Dichlorobenzene	mg/kg	0.010	ND	0.18
1,3-Dichlorobenzene	mg/kg	0.010	ND	--
1,4-Dichlorobenzene	mg/kg	0.010	ND	0.098
Dichlorodifluoromethane	mg/kg	0.010	ND	--
1,1-Dichloroethane	mg/kg	0.010	ND	--
1,2-Dichloroethane	mg/kg	0.010	ND	0.0027
1,1-Dichloroethene	mg/kg	0.010	ND	0.021
cis-1,2-Dichloroethene	mg/kg	0.010	ND	--
trans-1,2-Dichloroethene	mg/kg	0.010	ND	--
Methylene chloride	mg/kg	0.010	ND	0.095
1,2-Dichloropropane	mg/kg	0.010	ND	--
1,3-Dichloropropane	mg/kg	0.010	ND	--
2,2-Dichloropropane	mg/kg	0.010	ND	--
1,1-Dichloropropene	mg/kg	0.010	ND	--
cis-1,3-Dichloropropene	mg/kg	0.010	ND	--
trans-1,3-Dichloropropene	mg/kg	0.010	ND	--
Ethylbenzene	mg/kg	0.015	ND	0.21
Hexachlorobutadiene	mg/kg	0.010	ND	0.0067
Isopropylbenzene	mg/kg	0.010	ND	--
p-Isopropyltoluene	mg/kg	0.010	ND	--
n-Propylbenzene	mg/kg	0.010	ND	--
Styrene	mg/kg	0.050	ND	0.8
1,1,1,2-Tetrachloroethane	mg/kg	0.010	ND	--
1,1,2,2-Tetrachloroethane	mg/kg	0.050	ND	--
Tetrachloroethene	mg/kg	0.010	ND	0.16
Toluene	mg/kg	0.050	ND	0.49
1,2,3-Trichlorobenzene	mg/kg	0.010	ND	0.26
1,2,4-Trichlorobenzene	mg/kg	0.010	ND	0.23
1,1,1-Trichloroethane	mg/kg	0.010	ND	--
1,1,2-Trichloroethane	mg/kg	0.010	ND	--
Trichloroethene	mg/kg	0.010	ND	0.012
Trichlorofluoromethane	mg/kg	0.010	ND	--
1,2,3-Trichloropropane	mg/kg	0.020	ND	--
1,2,4-Trimethylbenzene	mg/kg	0.010	0.013	--
1,3,5-Trimethylbenzene	mg/kg	0.010	ND	--
Vinyl chloride	mg/kg	0.20	ND	0.00034
Xylenes	mg/kg	0.1	ND	12

Notes:

- 1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
- 2) ND - Not Detected, less than the limit of method detection.
- 3) -- No value established in the reference criteria.
- 4) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guidelines.
- 5) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 4A
Groundwater Indices Measured at Time of Sampling

Monitoring Well	pH	Electrical Conductivity (µg/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Total Dissolved Solid (mg/L)	Potential Redox (±mV)
MW-01	8.11	1,437	6.9	0.77	1,404.00	-83.6
MW-02	7.89	641	6.9	1.56	637.00	+42.3
MW-03	--	--	--	--	--	--

Notes:

- 1) Samples collected on Saturday, August 3, 2013.
- 2) Groundwater indices are field measured by YSI Pro Plus multi-meter.

Table 4B
Analytical Results - Groundwater - Routine Water Quality

Parameter	Unit	Detection Limit	MW-01	MW-02	Tier 1 Guideline
			08/03/2013		
<u>General Water Quality</u>					
Biochemical Oxygen Demand	mg/L	2.0	11	2	--
Chemical Oxygen Demand	mg/L	5.0	350	16	--
Conductivity	µS/cm	1.0	2,400	1,100	--
pH	Unitless	NA	7.20	7.51	6.5-8.5
Total Organic Carbon (C)	mg/L	0.50	10	3.5	--
Dissolved Cadmium (Cd)	µg/L	0.0050	0.037	0.025	--
Total Cadmium (Cd)	µg/L	0.0050	3.4	0.025	0.060*
Alkalinity (CaCO ₃)	mg/L	0.50	570	490	--
Bicarbonate (HCO ₃)	mg/L	0.50	700	600	--
Carbonate (CO ₃)	mg/L	0.50	ND	ND	--
Hydroxide (OH)	mg/L	0.50	ND	ND	--
Sulphates (SO ₄)	mg/L	1.0	100	48	--
Chlorides (Cl)	mg/L	1.0 - 5.0	360	36	--
Total Ammonia (NH ₃ -N)	mg/L	0.050 - 0.50	9	0.1	1.37*
Total Phosphorus (P)	mg/L	0.0030 - 0.0150	4.6	0.015	--
Total Nitrogen (N)	mg/L	0.050	12	0.26	--
Nitrate plus Nitrite (N)	mg/L	0.0030 - .015	0.019	ND	--
Total Kjeldahl Nitrogen (TKN)	mg/L	0.050 - 0.5	12	0.25	--
Nitrite (NO ₂)	mg/L	0.0030 - 0.015	ND	ND	--
Nitrate (NO ₃)	mg/L	0.0030	0.019	0.013	--
<u>Trace Organics</u>					
Acetic Acid	mg/L	50	ND	ND	--
Formic Acid	mg/L	50	ND	ND	--
Propionic Acid	mg/L	50	ND	ND	--
Adsorbable Organic Halogen	mg/L	0.004 - 0.02	0.29	0.016	--

Notes:

- 1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
- 2) * Surface Water Quality Guidelines for Use in Alberta (AENV, 1999) on aquatic life pathway. Canadian Council of Ministers of the Environment (CCME) Guidelines as referenced in the Tier 1 Guidelines.
- 3) ND - Not Detected, less than the limit of method detection.
- 4) -- No value established in the reference criteria.
- 5) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guideline.
- 6) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 4C
Analytical Results - Groundwater - Metals

Parameter	Detection Limit	MW-01	MW-02	Tier 1 Guideline
		08/03/2013		
Total Metals				
Aluminum (Al)	0.0030	34	0.29	0.1*
Antimony (Sb)	0.00060	0.0017	ND	0.006
Arsenic (As)	0.00020	0.085	0.00072	0.005
Barium (Ba)	0.010	1.8	0.15	1
Beryllium (Be)	0.0010	0.0024	ND	--
Boron (B)	0.020	0.11	0.065	1.5
Calcium (Ca)	0.30	330	150	--
Chromium (Cr)	0.0010	0.11	ND	0.001*
Cobalt (Co)	0.00030	0.078	0.0022	--
Copper (Cu)	0.00020	0.16	0.0023	0.003*
Iron (Fe)	0.060	180	0.98	0.3
Lead (Pb)	0.00020	0.10	0.00057	0.004*
Lithium (Li)	0.020	0.12	0.051	--
Magnesium (Mg)	0.20	170	52	--
Manganese (Mn)	0.0040	5.6	1.8	0.05
Molybdenum (Mo)	0.00020	0.0071	0.00034	0.073*
Nickel (Ni)	0.00050	0.20	0.0034	0.11*
Phosphorus (P)	0.10	3.4	ND	--
Potassium (K)	0.30	22	6.6	--
Selenium (Se)	0.00020	0.0026	ND	0.001
Silicon (Si)	0.10 - 0.50	100	9.9	--
Silver (Ag)	0.00010	0.00058	ND	0.0001*
Sodium (Na)	0.50	140	16	--
Strontium (Sr)	0.020	1.8	0.97	--
Sulphur (S)	0.20	32	15	--
Thallium (Tl)	0.00020	0.00097	ND	0.0008*
Tin (Sn)	0.0010	0.0029	ND	--
Titanium (Ti)	0.0010	0.71	0.015	--
Uranium (U)	0.00010	0.006	0.0097	0.02
Vanadium (V)	0.0010	0.17	0.0015	--
Zinc (Zn)	0.0030	0.41	0.0097	0.03
Dissolved Metals				
Aluminum (Al)	0.0030	0.017	0.011	--
Antimony (Sb)	0.00060	ND	ND	--
Arsenic (As)	0.00020	0.0230	ND	--
Barium (Ba)	0.010	0.68	0.13	--
Beryllium (Be)	0.0010	ND	ND	--
Boron (B)	0.020	0.074	0.063	--
Calcium (Ca)	0.30	160	140	--
Chromium (Cr)	0.0010	ND	ND	--
Cobalt (Co)	0.00030	0.012	0.0017	--
Copper (Cu)	0.00020	0.00078	0.002	--
Iron (Fe)	0.060	27	0.11	--
Lead (Pb)	0.00020	ND	ND	--
Lithium (Li)	0.020	0.051	0.049	--
Magnesium (Mg)	0.20	110	49	--
Manganese (Mn)	0.0040	1.9	1.8	--
Molybdenum (Mo)	0.00020	0.0015	0.00026	--
Nickel (Ni)	0.00050	0.022	0.002	--
Phosphorus (P)	0.10	ND	ND	--
Potassium (K)	0.30	14	6.6	--
Selenium (Se)	0.00020	ND	ND	--
Silicon (Si)	0.10	15	9.1	--
Silver (Ag)	0.00010	ND	ND	--
Sodium (Na)	0.50	140	17	--
Strontium (Sr)	0.020	1.60	0.98	--
Sulphur (S)	0.20	32	15	--
Thallium (Tl)	0.00020	ND	ND	--
Tin (Sn)	0.0010	ND	ND	--
Titanium (Ti)	0.0010	ND	ND	--
Uranium (U)	0.00010	0.0011	0.0092	--
Vanadium (V)	0.0010	ND	ND	--
Zinc (Zn)	0.0030	0.0067	0.0062	--

Notes:

- 1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
- 2) * Surface Water Quality Guidelines for Use in Alberta (AENV, 1999) on aquatic life pathway. Canadian Council of Ministers of the Environment (CCME) Guidelines as referenced in the Tier 1 Guidelines.
- 3) ND - Not Detected, less than the limit of method detection.
- 4) Unless specified all units are mg/L.
- 5) -- No value established in the reference criteria.
- 6) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guideline.
- 7) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 4D
Analytical Results - Groundwater - VOCs

Parameter	Detection Limit	MW-01	MW-02	Tier 1 Guideline
		08/03/2013		
Volatile Organic Compounds				
Benzene	0.00040	0.0015	ND	0.005
Toluene	0.00040	ND	ND	0.024
Ethylbenzene	0.00040	ND	ND	0.0024
Xylenes (Total)	0.00080	0.0018	ND	0.3
F1 (C ₆ -C ₁₀)	0.10	ND	ND	0.81
F2 (C ₁₀ -C ₁₆)	0.10	ND	ND	1.1
Total Trihalomethanes	0.0020	ND	ND	0.1
Bromodichloromethane	0.00050	ND	ND	--
Bromoform	0.00050	ND	ND	--
Bromomethane	0.0020	ND	ND	--
Carbon tetrachloride	0.00050	ND	ND	0.00056
Chlorobenzene	0.00050	ND	ND	0.0013
Chlorodibromomethane	0.0010	ND	ND	--
Chloroethane	0.0010	ND	ND	--
Chloroform	0.00050	ND	ND	0.0018
Chloromethane	0.0020	ND	ND	--
1,2-dibromoethane	0.00050	ND	ND	--
1,2-dichlorobenzene	0.00050	ND	ND	0.0007
1,3-dichlorobenzene	0.00050	ND	ND	--
1,4-dichlorobenzene	0.00050	ND	ND	0.001
1,1-dichloroethane	0.00050	ND	ND	--
1,2-dichloroethane	0.00050	ND	ND	0.005
1,1-dichloroethene	0.00050	ND	ND	0.014
cis-1,2-dichloroethene	0.00050	0.033	ND	--
trans-1,2-dichloroethene	0.00050	0.0034	ND	--
Dichloromethane	0.0020	ND	ND	0.05
1,2-dichloropropane	0.00050	ND	ND	--
cis-1,3-dichloropropene	0.00050	ND	ND	--
trans-1,3-dichloropropene	0.00050	ND	ND	--
Methyl methacrylate	0.00050	ND	ND	0.47
Methyl-tert-butyl ether (MTBE)	0.00050	ND	ND	0.015
Styrene	0.00050	ND	ND	0.072
1,1,1,2-tetrachloroethane	0.0020	ND	ND	--
1,1,2,2-tetrachloroethane	0.0020	ND	ND	--
Tetrachloroethene	0.00050	ND	ND	0.03
1,2,3-trichlorobenzene	0.0010	ND	ND	0.008
1,2,4-trichlorobenzene	0.0010	ND	ND	0.015
1,3,5-trichlorobenzene	0.00050	ND	ND	0.014
1,1,1-trichloroethane	0.00050	ND	ND	--
1,1,2-trichloroethane	0.00050	ND	ND	--
Trichloroethene	0.00050	ND	ND	0.005
Trichlorofluoromethane	0.00050	ND	ND	--
1,2,4-trimethylbenzene	0.00050	0.004	ND	--
1,3,5-trimethylbenzene	0.00050	0.0018	ND	--
Vinyl chloride	0.00050	0.003	ND	0.0011

Notes:

- 1) Tier 1 Guideline - Alberta Tier 1 Soil and Groundwater Remediation Guidelines, December 2010 and amendments. Coarse-grained criteria for residential/parkland land use.
- 2) ND - Not Detected, less than the limit of method detection.
- 3) Unless specified all units are mg/L (ppm).
- 4) -- No value established in the reference criteria.
- 5) Bold & Shaded - Exceeds the referenced Alberta Tier 1 Guidelines.
- 6) For further laboratory information, refer to the specific laboratory report in Appendix A.

Table 5A
Summary of Parameters Measured During Sampling of Soil Vapour

Parameter	Well Diameter (mm)	Screen Length (cm)	Well Depth (m)	Headspace Volume (cm ³)	Purge Rate (cm ³ /min)	Purge Time (min)	Pressure	
							Ambient (psi)	Vapour Well (psi)
VW-01	25	30	3.5	1,718.06	943.3	4	15.00	15.00
VW-02	25	30	4.6	2,258.02	943.3	7	15.10	15.06
VW-03	25	30	4.0	1,963.50	943.3	5	15.14	15.08

Notes:

- 1) Measurement of pressure by digital Cole-Parmer absolute pressure gauge.
- 2) Purge time is minimum elapsed time prior to the collection of a soil vapour sample.
- 3) Screen set at base of well.
- 4) Soil vapour sampling was completed on Saturday, August 3, 2013.

Table 5B
Analytical Results - Soil Vapour - General Indices

Parameter	Unit	Detection Limit	VW-01	VW-02	VW-03
<u>Gauge Pressure</u>					
Following sampling	psi	--	-5.0	NA	-5.0
Reported by laboratory	psi	--	-1.4	-3.6	-3.4
<u>Fixed Gases</u>					
Oxygen	% v/v	0.2 - 0.3	8.4	17.2	19.8
Nitrogen	% v/v	0.2 - 0.3	52.5	77.8	78.3
Carbon monoxide	% v/v	0.2 - 0.3	ND	ND	ND
Methane	% v/v	0.2 - 0.3	26	ND	ND
Carbon dioxide	% v/v	0.2 - 0.3	13.1	4.6	1.9

Notes:

- 1) Soil vapour sample collected on Saturday, August 3, 2013.
- 2) ND - Not Detected, less than the limit of method detection.
- 3) NA - Not Available.
- 4) -- No value established in the detection limit.
- 5) For further information, the reader should refer to the laboratory report in Appendix A.

Table 5C
Analytical Results - Soil Vapour - VOCs

Parameter	Unit	Detection Limit	VW-01	VW-02	VW-03
			08/03/13		
Hydrocarbon Fractions					
Aliphatic >C ₅ -C ₆	µg/m ³	5.0 - 480	53,000	332	6.8
Aliphatic >C ₆ -C ₈	µg/m ³	5.0 - 480	88,300	2,990	34.4
Aliphatic >C ₈ -C ₁₀	µg/m ³	5.0 - 480	ND	577	73.1
Aliphatic >C ₁₀ -C ₁₂	µg/m ³	5.0 - 480	664	345	202
Aliphatic >C ₁₂ -C ₁₆	µg/m ³	5.0 - 480	ND	106	105
Aromatic >C ₇ -C ₈ (TEX excluded)	µg/m ³	5.0 - 480	ND	ND	ND
Aromatic >C ₈ -C ₁₀	µg/m ³	5.0 - 480	ND	44.8	30.9
Aromatic >C ₁₀ -C ₁₂	µg/m ³	5.0 - 480	ND	78.4	58.1
Aromatic >C ₁₂ -C ₁₆	µg/m ³	5.0 - 480	ND	ND	ND
Select Volatile Gases					
Acetylene	ppm	0.19 - 0.34	ND	ND	ND
Ethane	ppm	0.19 - 0.34	1.1	ND	ND
Ethylene	ppm	0.19 - 0.34	0.67	ND	ND
Methane	ppm	5.6 - 6.8	260,000	67	ND
n-Butane	ppm	0.358 - 0.68	2.4	ND	ND
n-Pentane	ppm	0.19 - 0.34	14	ND	ND
Propane	ppm	0.19 - 0.34	0.34	ND	ND
Propene	ppm	0.19 - 0.34	0.22	ND	ND
Propyne	ppm	0.38 - 0.68	ND	ND	ND
Volatile Organic Compounds					
Dichlorodifluoromethane (FREON 12)	ppbv	0.20 - 58	ND	348	1.60
1,2-Dichlorotetrafluoroethane	ppbv	0.17 - 16	ND	34.4	0.58
Chloromethane	ppbv	0.30 - 29	ND	ND	1.03
Vinyl chloride	ppbv	0.18 - 17	519	0.51	ND
Chloroethane	ppbv	0.30 - 29	ND	ND	ND
1,3-Butadiene	ppbv	0.50 - 48	ND	ND	ND
Trichlorofluoromethane (FREON 11)	ppbv	0.20 - 19	ND	50.6	0.42
Ethanol (ethyl alcohol)	ppbv	23 - 220	322	180	648
Trichlorotrifluoroethane	ppbv	0.15 - 14	ND	ND	ND
2-propanol	ppbv	3.0 - 290	ND	3.6	5.1
2-Propanone	ppbv	0.80 - 76	ND	36.5	18
Methyl ethyl ketone (MEK) (2-Butanone)	ppbv	3.0 - 290	ND	ND	5.8
Methyl isobutyl ketone	ppbv	3.2 - 300	ND	ND	ND
Methyl butyl ketone (MBK) (2-Hexanone)	ppbv	2.0 - 190	ND	ND	ND
Methyl t-butyl ether (MTBE)	ppbv	0.20 - 19	ND	ND	ND
Ethyl acetate	ppbv	2.2 - 210	ND	ND	ND
1,1-Dichloroethylene	ppbv	0.25 - 24	ND	1.41	ND
cis-1,2-Dichloroethylene	ppbv	0.19 - 18	123	13.2	0.42
trans-1,2-Dichloroethylene	ppbv	0.20 - 19	30	ND	ND
Methylene chloride(Dichloromethane)	ppbv	0.80 - 120	ND	1.47	1.06
Chloroform	ppbv	0.15 - 14	ND	18.2	0.52
Carbon tetrachloride	ppbv	0.30 - 29	ND	ND	ND
1,1-Dichloroethane	ppbv	0.20 - 19	ND	ND	ND
1,2-Dichloroethane	ppbv	0.20 - 19	ND	ND	ND
Ethylene dibromide	ppbv	0.17 - 16	ND	ND	ND
1,1,1-Trichloroethane	ppbv	0.30 - 29	ND	3.45	ND
1,1,2-Trichloroethane	ppbv	0.15 - 14	ND	ND	ND
1,1,2,2-Tetrachloroethane	ppbv	0.20 - 19	ND	ND	ND
cis-1,3-Dichloropropene	ppbv	0.18 - 17	ND	ND	ND
trans-1,3-Dichloropropene	ppbv	0.17 - 16	ND	ND	ND
1,2-Dichloropropane	ppbv	0.40 - 38	ND	ND	ND
Bromomethane	ppbv	0.18 - 17	ND	ND	ND
Bromoform	ppbv	0.20 - 19	ND	ND	ND
Bromodichloromethane	ppbv	0.20 - 19	ND	ND	ND
Dibromochloromethane	ppbv	0.20 - 19	ND	ND	ND
Trichloroethylene (TCE)	ppbv	0.30 - 29	ND	81.9	1.32
Tetrachloroethylene (PCE)	ppbv	0.20 - 19	ND	221	ND
Benzene	ppbv	0.18 - 17	ND	5.17	0.79
Toluene	ppbv	0.20 - 81	ND	4.80	3.95
Ethylbenzene	ppbv	0.20 - 27	ND	0.75	0.92
p+m-xylene	ppbv	0.37 - 99	ND	1.89	3.65
o-xylene	ppbv	0.20 - 19	ND	1.22	1.67
Styrene	ppbv	0.20 - 19	42	ND	0.37
4-ethyltoluene	ppbv	2.2 - 210	ND	ND	ND
1,3,5-Trimethylbenzene	ppbv	1.9 - 48	ND	4.05	ND
1,2,4-Trimethylbenzene	ppbv	0.50 - 48	ND	2.31	2.74
Chlorobenzene	ppbv	0.20 - 19	ND	ND	ND
Benzyl chloride	ppbv	1.0 - 95	ND	ND	ND
1,3-Dichlorobenzene	ppbv	0.40 - 38	ND	ND	ND
1,4-Dichlorobenzene	ppbv	0.40 - 38	ND	ND	ND
1,2-Dichlorobenzene	ppbv	0.40 - 38	ND	ND	ND
1,2,4-Trichlorobenzene	ppbv	2.0 - 190	ND	ND	ND
Hexachlorobutadiene	ppbv	3.0 - 290	ND	ND	ND
Hexane	ppbv	1.3 - 29	17,800	142	ND
Heptane	ppbv	0.30 - 29	1,970	181	0.58
Cyclohexane	ppbv	0.20 - 19	4,900	219	0.35
Tetrahydrofuran	ppbv	0.40 - 38	ND	ND	5.14
1,4-Dioxane	ppbv	2.0 - 190	ND	ND	ND
Xylene (Total)	ppbv	0.60 - 99	ND	3.11	5.31
Vinyl bromide	ppbv	0.20 - 19	ND	ND	ND
Propene	ppbv	3.9 - 29	371	ND	ND
2,2,4-Trimethylpentane	ppbv	0.20 - 19	ND	ND	0.64
Carbon disulfide	ppbv	0.50 - 48	ND	40.5	3.21
Vinyl acetate	ppbv	0.20 - 19	ND	ND	ND

Notes:

- 1) Results are from sampling completed on Saturday, August 03, 2013.
- 2) ND - Not Detected, less than the limit of method detection.
- 3) For further information, the reader should refer to the laboratory report in Appendix A.

Table 5D
Analytics Results - Soil Vapour - Siloxanes

Parameter	Detection Limit		VW-01		VW-02		VW-03	
	mg/m ³	ppm	08/03/13					
			mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm
Trimethylsilyl Fluoride	--	--	ND	ND	ND	ND	ND	ND
Tetramethylsilane	0.00010 - 0.0022	0.0001 - 0.0006	ND	ND	ND	ND	ND	ND
Methoxytrimethylsilane	0.0032 - 0.0563	0.0007 - 0.0132	ND	ND	ND	ND	ND	ND
Ethoxytrimethylsilane	0.0031 - 0.0543	0.0006 - 0.0112	ND	ND	ND	ND	ND	ND
Trimethylsilanol	--	--	0.0338	0.0092	ND	ND	0.0098	0.0027
Isopropoxytrimethylsilane	0.0013 - 0.0229	0.00020 - 0.0042	ND	ND	ND	ND	ND	ND
Trimethoxymethyl Silane #	--	--	ND	ND	ND	ND	ND	ND
Hexamethyl Disiloxane - L2	0.00010 - 0.0021	0.0001 - 0.0003	ND	ND	ND	ND	ND	ND
Propoxytrimethylsilane	0.0035 - 0.0621	0.0006 - 0.0115	ND	ND	ND	ND	ND	ND
1-Methylbutoxytrimethylsilane *	--	--	ND	ND	ND	ND	ND	ND
Butoxytrimethylsilane *	--	--	ND	ND	ND	ND	ND	ND
Trimethoxyvinyl Silane #	--	--	ND	ND	ND	ND	ND	ND
Hexamethyl Cyclotrisiloxane - D3	--	--	0.1927	0.0212	0.0844	0.0093	0.0146	0.0016
Octamethyl Trisiloxane - L3	0.0002 - 0.0041	0.0001 - 0.0004	ND	ND	ND	ND	ND	ND
Triethoxyvinyl Silane #	--	--	ND	ND	ND	ND	ND	ND
Triethoxyethyl Silane #	--	--	ND	ND	ND	ND	ND	ND
Octamethyl Cyclotetrasiloxane - D4	--	--	0.0739	0.0061	0.0299	0.0025	0.0234	0.0019
Decamethyl Tetrasiloxane - L4	0.0003 - 0.0053	0.0001 - 0.0004	ND	ND	ND	ND	ND	ND
Tetraethylsilicate #	--	--	ND	ND	ND	ND	ND	ND
Decamethyl Cyclopentasiloxane - D5	--	--	0.0349	0.0023	0.0321	0.0021	0.0420	0.0028
Dodecamethyl Pentasiloxane - L5	0.0030 - 0.0528	0.0002 - 0.0034	ND	ND	ND	ND	ND	ND
Dodecamethyl Cyclohexasiloxane - D6	0.0531	0.0029	ND	ND	0.1454	0.0080	0.1513	0.0083
Sum	--	--	0.6503	0.0870	0.4152	0.0432	0.2559	0.0198

Notes:

- 1) Soil vapour samples collected on Saturday, August 3, 2013.
- 2) ND - Not Detected, less than the limit of method detection.
- 3) -- No value established in the detection limit.
- 4) VW-01 V=10.0mL, VW-02 V=25mL, VW-03 V=200 mL, where V is volume of air/gas sampled.
- 5) * - Semiquantitative (response factor set at 5).
- 6) # - Unstable, poor detectability, commercial standards tested.
- 7) For further information, the reader should refer to the laboratory report in Appendix A.

APPENDIX F

BOREHOLE LOGS



Borehole No: 25VW-04

Project: Red Deer Motors Pre-1972 Site

Project No: SWM.SWOP04071-04

Location: SE 1/4, Sec. 8-38-27 W4M

Red Deer, Alberta

UTM: 307637 E; 5792603 N; Z 12

Depth (m)	Method	Soil Description	Notes and Comments	Depth (ft)
0				0
	Solid Stem Auger	ORGANICS AND TOPSOIL - (300 mm thick)	Pipe stickup = 0.98 metres	0
		SILT (FILL) - sandy, trace clay, well graded, dry, stiff, brown		1
1		CLAY AND WASTE (FILL) - sandy, trace silt, damp, firm, dark grey, waste (glass, plastic bags, fabrics, plastic), ambient waste odour		2
2		- some silt, trace sand, wet		3
3		END OF BOREHOLE (3.05 metres) water - 2.92 metres at completion Monitoring well installed to 2.50 metres		10



Contractor: Ernco Environmental Drilling & Coring Inc.

Completion Depth: 3.05 m

Equipment Type: GeoProbe 3230DT

Start Date: 2025 January 15

Logged By: WV

Completion Date: 2025 January 15

Reviewed By: SB

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PROJECT: Phase II Environmental Site Assessment	BOREHOLE No.: MW-01
PROJECT No.: 12-435	DRILL TYPE: SS Auger
LOCATION: Red Deer Motors Site	GROUND ELEVATION: 874.014 m
CLIENT: The City of Red Deer	COMPLETION DATE: 06/26/2013

Sample Type: <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Split Spoon <input type="checkbox"/> Core <input type="checkbox"/> Disturbed <input type="checkbox"/> No Recovery
Backfill Type: <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Silica Sand <input type="checkbox"/> Grout <input type="checkbox"/> Pea Gravel <input type="checkbox"/> Drill Cuttings <input type="checkbox"/> Bentonite : Sand

Notes: Groundwater Monitoring Well is ~ 6 m east of trees along Taylor Drive and ~7 m south of 32 Street, near the northwest corner of the site.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Grass/loam - soft, silty, sandy, moist, olive. (~ 3 cm thick). Sand (fill) - dense to compact, silty, trace clay, damp, yellow.					
1.0	Loam (fill) - compact, silty, sandy, trace clay, damp, dark olive.					
2.0	Clay (fill) - firm, loamy, silty, trace fine rounded gravel, distinctive slough gas odour, moist, dark olive. wood debris at 1.8 m to 2.4 m.					
3.0	No obvious waste material. Sand (fill) - compact to loose, silty, trace clay, mild hydrocarbon odour, moist, light olive.		J			
4.0	becomes wet and trace silt at 3.8 m. some gravel at 4.3 m.					
5.0	Clay (fill) - stiff, trace silt, trace sand, moist, olive. mild hydrocarbon odour at 4.6 m - 5.2 m		J			
6.0	End of hole at 6.1 m. 51 mm diameter 4.6 m length 010 PVC screen. Aboveground lockable steel casing set in concrete.					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

Tiamat Environmental Consultants Ltd.	Slough :	Completion Depth (m): 6.1
	Depth to Groundwater :	Checked By: LTM
	Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	BOREHOLE No.: VW-01
PROJECT No.: 12-435	DRILL TYPE: SS Auger
LOCATION: Red Deer Motors Site	GROUND ELEVATION: 874.194 m
CLIENT: The City of Red Deer	COMPLETION DATE: 06/26/2013

Sample Type: <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Split Spoon <input type="checkbox"/> Core <input type="checkbox"/> Disturbed <input type="checkbox"/> No Recovery
Backfill Type: <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Silica Sand <input type="checkbox"/> Grout <input type="checkbox"/> Pea Gravel <input type="checkbox"/> Drill Cuttings <input type="checkbox"/> Bentonite : Sand

Notes: Soil Vapour Well is ~ 2 m east of MW-01, near the northwest corner of the site.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Grass (~ 3 cm thick). Sand (fill) - compact, silty, clayey, damp, light olive brown.					
1.0	becomes dark olive and loamy at 0.8 m.					
2.0	Silt (fill) - firm, clayey, moist, dark olive.					
3.0	wood fragments at 2.3 m. mild hydrocarbon odour at 3 m.					
4.0	End of hole at 3.5 m. 25 mm diameter 30 cm length 020 PVC screen. Aboveground lockable steel casing set in concrete.					
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

Tiamat Environmental Consultants Ltd.	Slough :	Completion Depth (m): 3.5
	Depth to Groundwater :	Checked By: LTM
	Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	BOREHOLE No.: VW-02
PROJECT No.: 12-435	DRILL TYPE: SS Auger
LOCATION: Red Deer Motors Site	GROUND ELEVATION: 877.321 m
CLIENT: The City of Red Deer	COMPLETION DATE: 06/26/2013

Sample Type: <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Split Spoon <input type="checkbox"/> Core <input type="checkbox"/> Disturbed <input type="checkbox"/> No Recovery
Backfill Type: <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Silica Sand <input type="checkbox"/> Grout <input type="checkbox"/> Pea Gravel <input type="checkbox"/> Drill Cuttings <input type="checkbox"/> Bentonite : Sand

Notes: Soil Vapour Well is located on the southeast side of the site.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Grass (~ 3 cm thick). Sand (fill) - loose, trace silt, trace loam, trace clay, damp, light olive brown. trace rootlets to 1.2 m					
1.0	trace plastic bags at 0.9 m to 1.1 m.					
2.0	Clay (fill) - stiff, silty, trace sand, moist, light olive.					
3.0	No obvious waste material. Sand (fill) - compact, silty, moist, light olive. trace coal at 3 m.					
4.0	trace gravel at 4 m.					
5.0	becomes loose at 4.6 m trace gravel and becomes wet at 5 m.					
6.0	End of hole at 6.1 m. 25 mm diameter 30 cm length 020 PVC screen. Aboveground lockable steel casing set in concrete.					
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						

Tiamat Environmental Consultants Ltd.	Slough :	Completion Depth (m): 6.1
	Depth to Groundwater :	Checked By: LTM
	Logged By: JAL	Page: 1 of 1

PROJECT: Phase II Environmental Site Assessment	BOREHOLE No.: VW-03
PROJECT No.: 12-435	DRILL TYPE: SS Auger
LOCATION: Red Deer Motors Site	GROUND ELEVATION: 877.316 m
CLIENT: The City of Red Deer	COMPLETION DATE: 06/27/2013

Sample Type: <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> Split Spoon <input type="checkbox"/> Core <input type="checkbox"/> Disturbed <input type="checkbox"/> No Recovery
Backfill Type: <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Silica Sand <input type="checkbox"/> Grout <input type="checkbox"/> Pea Gravel <input type="checkbox"/> Drill Cuttings <input type="checkbox"/> Bentonite : Sand

Notes: Soil Vapour Well is near the northeast corner of the site.

Depth (m)	Soil Description	Sample Type	Sample No.	SPT (N)	Combustible Soil Vapours (ppm)	Well Details
0.0	Grass. (~ 3 cm thick). Clay (fill) - firm to stiff, silty, moist, olive.					
1.0	trace plastic bags at 0.9 m.					
2.0	trace coal at 2.1 m.					
3.0	trace gravel at 2.6 m. No obvious waste material.					
4.0	becomes wet at 4 m.					
5.0						
6.0	Sand (fill) - loose, silty, wet, olive.					
7.0						
8.0	End of hole at 7.6 m. 25 mm diameter 30 cm length 020 PVC screen. Flush mount lockable steel casing set in concrete.					
9.0						
10.0						
11.0						
12.0						

Tiamat Environmental Consultants Ltd.	Slough :	Completion Depth (m): 7.6
	Depth to Groundwater :	Checked By: LTM
	Logged By: JAL	Page: 1 of 1



Borehole No: VW-04

Project: Red Deer Motors Vapour Probe Installation

Project No: SWM.SWOP04071-02.008

Location: Red Deer Motors

Red Deer, Alberta

UTM: 307335 E; 5792605 N; Z 12

Depth (m)	Method	Soil Description	Notes and Comments	VW04	Depth (ft)
0					0
0 - 1	Solid stem auger	TOPSOIL - organics, roots, dry, black			0 - 1
1 - 3		WASTE - sandy clay, some gravel, dry, wires, bags, plastic, glass, strong odour			1 - 3
3 - 4		CLAY - sandy, damp, brown and black			3 - 4
4		END OF BOREHOLE (4.0 metres) Vapour well installed to 2.4 metres			4
5					16



Contractor: CP Drilling

Completion Depth: 4 m

Equipment Type: Truck mounted

Start Date: 2021 May 4

Logged By: MR

Completion Date: 2021 May 4

Reviewed By: FH

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