McCollum Park & Emander Landfill Vapor Intrusion Risk Assessment Summary

Prepared for

Snohomish County
Washington

Department of Public Works Solid Waste Division

November 2021

Prepared by

Parametrix

This Page Intentionally Left Blank

McCollum Park & Emander Landfill Vapor Intrusion Risk Assessment Summary

Prepared for

Snohomish County
Department of Public Works Solid Waste Division
3000 Rockefeller Ave
Everett, WA 98201

Prepared by

Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104
T. 206.394.3700 F. 1.855.542.6353
www.parametrix.com

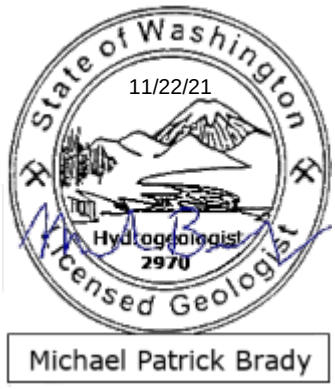
November 2021 | 373-1513-112 T03

CITATION

Parametrix, 2021. McCollum Park & Emander Landfill Vapor Intrusion Risk Assessment Summary. Prepared by Parametrix, Seattle, Washington. November 2021.

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional hydrogeologist licensed to practice as such, is affixed below.



Prepared by Michael P. Brady, LG, LHG

Checked by Lisa A. Gilbert, LG, LHG

Approved by Ian Sutton, PE

This Page Intentionally Left Blank

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

Aspect	Aspect Consulting LLC
cPAHs	carcinogencic polycyclic aromatic hydrocarbons
Ecology	Washington State Department of Ecology
EDB	Ethylene Dibromide
EMB	EMB Consulting LLC
FS	Feasibility Study
LFG	landfill gas
MTCA	Model Toxics Control Act
PCBs	polychlorinated biphenyls
Qtb	Quaternary transitional beds
Qva	Quaternary Vashon Advance Outwash
RI	Remedial Investigation
TPH	Total Petroleum Hydrocarbons
µg/L	micrograms per liter
µg/m³	micrograms per cubic meter
VI	Vapor Intrusion
VOCs	volatile organic compounds
WAC	Washington Administrative Code
WSU	Washington State University

This Page Intentionally Left Blank

1. INTRODUCTION

Parametrix was retained by Snohomish County Department of Public Works Solid Waste Division (County) to investigate potential vapor intrusion (VI) at the former Emander Landfill located at 600 128th Street SE in Everett, Washington (Figure 1).

This report presents a VI risk assessment summary by incorporating the results of the Vapor Intrusion Screening conducted by Parametrix (Parametrix 2021; Appendix A) with the findings of a Preliminary Vapor Intrusion Assessment conducted by EMB Consulting LLC (EMB) [EMB 2021, Appendix B] and a Tier II Assessment conducted by Aspect Consulting LLC (Aspect) [Aspect 2021, Appendix C].

1.1 Background

The Emander Landfill has been redeveloped as McCollum Park. McCollum Park includes a park and ride lot, a bus station, athletic fields, a dirt bike track, pathways, nature trails, a playground, a community pool, the Snohomish County Washington State University (WSU) Extension Center, and the Adopt-a-Stream Northwest Stream Center (Figure 2).

The property was originally obtained by the County in 1922, and gravel mining began in 1929. The site was later used as a municipal solid waste landfill from 1947 to 1967 (AGI Technologies, 1996). Landfill gas (LFG) investigations and mitigation measures were started in the 1970's and 1980's and a Remedial Investigation (R)) and a Feasibility Study (FS) were completed in 1996 during redevelopment to include a park and ride facility. Prior protectiveness statements for the landfill have referenced the active LFG control systems to mitigate potential air quality hazards related to the former landfill.

1.2 Physical Setting

The site is located in Section 30 of Township 28 North, Range 5 East at an elevation of approximately 390 to 370 feet above sea level. Soil, groundwater, and LFG studies of the landfill have attempted to delineate the nature and extent of contamination as well as defining the physical setting of the property. Minard (1985) maps the surface geology of the site as Quaternary Vashon Advance Outwash (Qva) deposits. Qva deposits are primarily comprised of coarse-grained sand and gravel deposits. Investigations completed during the RI and FS showed the sand and gravel portion of the Qva deposits ranging from 13 to 65 feet thick. The Esperance Sand member of the Qva deposits was found underlying the sand and gravel. The Esperance Sand member is comprised of predominantly sand with few gravel lenses and silt interbeds. Investigations of the property show the Esperance Sand member being 47 to 89 feet thick. Underlying the Qva deposits is a lower confining layer consisting of clay.

Minard (1985) maps the clay at Quaternary transitional beds (Qtb), these are described in the RI and FS as the Lawton Clay. The Lawton Clay thickness was not fully penetrated by investigations; however, Minard (1985) indicates the clay extends down to an elevation approximately 160 feet above sea level on the upland margins, or approximately 220 feet below ground surface at the landfill.

Groundwater is present within the Qva deposits serving as the outwash aquifer. Previous reports for the landfill describe two zones of the outwash aquifer (upper and lower) having slightly different flow directions. The predominant groundwater flow path at the site is to the south following the flow of North Creek, and is predominantly southwest in the upper portion of the outwash aquifer and south-southwest in the lower portion of the outwash aquifer (Snohomish County, 2018). The outwash aquifer is unconfined and at relatively shallow depths ranging from 2 to 24 feet below the site (AGI Technologies, 1996).

1.3 Land Use

As noted above, the Emander Landfill was redeveloped as McCollum Park in 1996. McCollum Park contains a park and ride lot and bus station on the north and northwest portions of the park; a former BMX biking track and building in the central portion of the park; a pool building and outdoor swimming pool on the northwest portion of the park; a WSU Extension Building, a WSU Education Building, and Adopt-A-Stream Building on the southwest portion of the park; athletic fields; pathways; playgrounds; parking; and driveways. The surrounding area is predominantly vacant forested land to the west and south along North Creek, a golf driving range and single-family residences north across 128th Street SE, and multi-family apartments to the east-southeast. The park is a very popular recreation spot within southwest Snohomish County. Figure 2 displays the locations of the on-site features.

1.4 Landfill Gas Systems

LFG is managed at the property by a series of vertical and horizontal collection points. Attachment A in Appendix A displays the LFG management system layout. A total vacuum is applied to the system which collects LFG across the property. The LFG is collected into a main underground manifold near the bus station which routes LFG to the flare facility. The flare is manually lit by County staff periodically until a flame is no longer supported by the methane. At that point, the vacuum system vents the LFG to the atmosphere.

The effectiveness of the LFG management system is routinely monitored at five gas probes across the property to confirm LFG capture and no presence of methane at gas probes GP-14, GP-15, GP-16, GP-18, and GP-19 by the County. Methane is typically absent or below 1.25% by volume methane (25% of the lower explosive limit). The methane monitoring is done during rising barometric pressure, falling barometric pressure, and static barometric pressure conditions. The barometric pressure changes do not appear to affect the results of monitoring as methane is typically routinely absent. The methane monitoring is done in conformance with Chapter 173-340 Washington Administrative Code (WAC),) as part of the cleanup action plan.

Figure 2 displays the location of the flare facility and active gas probes.

1.5 Groundwater Monitoring

Groundwater monitoring has historically been completed quarterly at approximately 13 wells. Upper aquifer completed wells BH-03, BH-05, BH-06, BH-07, and BH-08, intermediate zone completed well MW-17, and lower aquifer completed wells MW-12, MW-14, MW-15, MW-16, MW-18, MW-19, and MW-20 are sampled. Quarterly monitoring data from these wells for volatile organic compounds (VOCs), metals, polychlorinated biphenyls (PCBs), carcinogenic polycyclic aromatic hydrocarbons (cPAHs) are available from the Washington State Department of Ecology's (Ecology),) Cleanup Site Identification document repository for years 2013 through March 2020 (Ecology, 2020). Figure 2 displays the location of the active monitoring wells.

1.6 VI Evaluation Approach

Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology, revised 2018) provides the methodologies used to evaluate VI from contamination sources. The first step in assessing VI is performing a preliminary assessment. This is to identify potential

sources of VI, determine proximity to the contaminants, and determine if additional investigation for VI is necessary.

If the preliminary assessment finds potential sources of VI within proximity of occupied buildings, the next stage is a Tier I Assessment. A Tier I Assessment primarily involves screening soil and groundwater for comparison to Ecology's Model Toxics Control Act (MTCA; WAC 173-340) Method B screening levels. A Tier I Assessment may also involve collecting soil gas concentrations and comparison to MTCA Method B screening levels. The Tier I Assessment may also include analysis using predictive models such as the Johnson and Ettinger model to determine likely indoor air concentrations. If the Tier I Assessment determines screening levels are exceeded or predictive models suggest hazardous indoor air concentrations, then the next stage is a Tier II Assessment.

A Tier II Assessment typically involves collection of indoor air samples and comparison to MTCA Method B indoor air cleanup levels. The Tier II Assessment also involves distinguishing between VI sources and other sources of contamination of indoor air quality. Typically, if the Tier II Assessment determines VI is the source of indoor air quality hazards and those hazards are found above indoor air cleanup levels, engineering controls are required to be implemented (i.e. high efficiency heating, ventilation, and air conditioning (HVAC) systems, installation of geomembranes above slabs, installation of passive ventilation systems, or installation of soil vapor extraction systems).

2. PRELIMINARY ASSESSMENT

The LFG control system in place at the landfill prevents migration of LFG and collects and discharges LFG at the flare facility. The refuse at the landfill no longer produces enough methane to maintain continuous combustion at the flare. However, the vacuum pressure on the system is maintained to prevent LFG migration. If there was an LFG breakthrough it could potentially cause a VI risk at the site due to the location of on-site buildings and surrounding residences.

Volatilization from contaminated groundwater is a potential secondary source of VI at the site. Groundwater is very shallow on the southern portion of the site. Contaminants in groundwater are volatile and toxic. Groundwater beyond the LFG control system could potentially volatilize and cause a VI risk at the site.

Therefore, at the McCollum Park / Emander Landfill site two primary pathways for potential VI were identified in the preliminary VI assessment:

- LFG to vapor (migration of LFG)
- Groundwater to vapor (volatilization from contaminated groundwater)

2.1 Vapor Intrusion Screening Criteria

Groundwater analysis for VOCs is primarily performed using United States Environmental Protection Agency (EPA) Method 8260C. Air or vapor analysis for VOCs is primarily performed by using EPA Compendium Method TO-15.

Results of groundwater, air, and vapor for this study were compared to the MTCA Method B screening and cleanup levels as published in Ecology's Cleanup Levels and Risk Calculations (CLARC) database (Ecology 2021). The screening and cleanup levels include both cancer and non-cancer levels. Typically, cancer screening levels are much lower than the non-cancer values.

The groundwater to vapor pathway is evaluated in micrograms per liter (µg/L). All other values for air or VI screening/cleanup levels are evaluated in micrograms per cubic meter (µg/m^3).

3. TIER I ASSESSMENT

Parametrix (Parametrix 2021) performed a Tier I Assessment of VI at the landfill by performing landfill gas screening, groundwater screening, and deep-soil gas screening. Samples of LFG and deep soil gas were collected for the Tier I Assessment. Existing groundwater data was utilized for screening in the Tier I Assessment and one headspace sample was collected from an existing monitoring well.

3.1 Groundwater to Vapor Pathway Screening

Groundwater results reported in Ecology's Environmental Information Management database for 2013 through March 2020 were compared with the MTCA Method B cancer and non-cancer screening levels for the groundwater to vapor pathway. Table 1, attached, summarizes the results of the groundwater VI screening. Figure 2 displays the locations of on-site groundwater monitoring wells.

3.1.1 Groundwater Screening Results

Table 1 summarizes the groundwater results and compares them with MTCA Method B groundwater screening levels for VI. For the groundwater to vapor pathway:

- Benzene was found above the MTCA Method B cancer screening level of 2.4 µg/L in historical data but was not detected in recent 2019-2020 groundwater monitoring.
- Vinyl chloride was found above the MTCA Method B cancer screening level of 0.34 µg/L with very high exceedances in historical data up to 87.80 µg/L appearing related to a slug source, and as high as 5.0 µg/L in recent 2019-2020 groundwater monitoring.
- Ethylene dibromide (EDB) was reported at 0.30 µg/L in a historical sample which is the MTCA Method B cleanup level.
- 33 other air toxics were either non-detect or below MTCA Method B cancer and non-cancer screening levels.
- Acrolein, benzyl chloride, 1,3 butadiene, cumene, cyclohexane, 1,4-dioxane, ethyl acetate, n-heptane, n-hexane, methyl methacrylate, methyl tertiary butyl ether, n-propylbenzene, tetrahydrofuran, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene were not historically tested in groundwater.

3.1.1.1 Benzene

Benzene was found at BH-07 to be up to 4.0 µg/L which is above the screening level of 2.4 µg/L. The data show benzene above the screening level at BH-07 from December 2013 through September 2014. Since that time, benzene has remained below the screening level and has been non-detect (<1 µg/L) from September 2015 through the present. Benzene was not detected at any other monitoring well locations. Based on the recent data, it does not appear the groundwater to vapor pathway for benzene is complete.

3.1.1.2 Vinyl Chloride

Vinyl chloride was found above the screening level of 0.34 µg/L at BH-03A, BH-05, BH-06, BH-07, MW-14, MW-16, MW-18, MW-19, and MW-20. The highest concentration recorded at the site from 2013 to

2020 was at MW-18 in March 2014 at 87.8 µg/L. These high concentrations at MW-18 appear to be related to a slug source due to high groundwater or new saturation that occurred near that time period.

For recent data only (2019 and 2020), vinyl chloride was found above the screening level at BH-03, BH-05, BH-07, MW-16, and MW-18. These locations are located in the downgradient portion of the property where vinyl chloride is most likely to be present as a daughter product of reductive dechlorination. BH-07 and MW-18 are located outside the footprint of the LFG collection system and are immediately adjacent to the WSU Education Building and upgradient of the WSU Extension Building and Adopt-A-Stream Building. These two wells have the highest concentrations of vinyl chloride at the site, and the most recent data available from March 2020 were 5.00 µg/L at MW-18 and 1.05 µg/L at BH-07. The data indicate vinyl chloride likely currently exceeds the MTCA Method B cancer screening level for the groundwater to vapor pathway near the on-site buildings.

3.1.1.3 EDB

EDB was reported at the MTCA Method B cancer screening level of 0.30 µg/L at MW-10 in 2013. This result was J-flagged by the laboratory indicating it is an estimate. EDB has been non-detect in all wells at the site since 2013 and less than 0.01 µg/L for all wells in the 2019 and 2020 data. Based on the data, it does not appear the groundwater to vapor pathway for EDB is complete.

3.2 Landfill Gas to Vapor Pathway Screening

3.2.1 VOC Sample Results

In order to evaluate VOCs related to the LFG control system, Parametrix collected a sample of the LFG at the flare facility (Figure 2) using a summa canister on April 28, 2021. This sample is representative of the VOCs present in the LFG currently being controlled by the system and would be typical of LFG that could potentially escape and be a VI risk if not continuously controlled. The sample was tested using EPA Compendium Method TO-15.

Table 1 summarizes the LFG results for the sample collected at the flare and compares them to MTCA Method B cancer and non-cancer cleanup levels for ambient air. The results for the LFG discharging at the flare indicate the following:

- Eight VOCs including benzene, chlorobenzene, 1,4-dichlorobenzene, n-hexane, n-heptane, 1,2,4-trimethylbenzene, vinyl chloride, and total xylenes were found above the MTCA Method B cleanup levels for air.
- Cyclohexane and ethylbenzene were detected but at concentrations below the MTCA Method B cleanup levels for air.
- 41 other VOCs were not detected in the sample. Several detection limits reported in the sample results are above the MTCA Method B cleanup levels; therefore, there may be exceedances not identified by the results due to the dilution requirements of the sample.

The LFG appears typical of an aging closed landfill. The results of the LFG analysis confirm the LFG control system is actively removing VOCs and reducing VI risk related to potential LFG migration. VI from LFG migration would have a similar chemistry to those exhibited at the flare.

3.2.2 Methane

Methane was measured at 15.4% to 15.9% by volume at the flare. These results appear to be consistent with recent County data and typical of an aging closed landfill.

3.3 Deep Soil Gas and Groundwater to Vapor Pathway Screening

To evaluate LFG migration and groundwater to vapor pathways, air was sampled in the gas probes surrounding the landfill. As shown on Figure 2, the gas probes are located outside of the refuse. To further evaluate the potential groundwater to vapor pathway, air was sampled in one well, BH-07, located near the southern portion of the site. Figure 2 displays the location of the well. BH-07 is one of the wells previously identified above VI screening levels for vinyl chloride.

On April 28, 2021, Parametrix performed the air sampling and methane measurements from four gas probes GP-14, GP-15, GP-18, and GP-19 and one monitoring well, BH-07. Gas probe GP-16 on the southwest portion of the site was not sampled as it was completely blocked with water and would not provide useful data. No methane was detected at any of the locations.

3.3.1 Methane Measurements

The County performed routine methane monitoring at each of the gas probe locations prior to Parametrix measuring LFG concentrations. The County purged on each of the gas probes for 30 seconds until parameters stabilized and then recorded the information. Parametrix performed an additional purge of up to 3 well volumes prior to recording LFG concentrations.

Methane was not detected (0.0% by volume) at all measurement locations (GP-14, GP-15, GP-18, GP-19, and BH-07).

3.3.2 VOC Sample Results

Table 2 summarizes the results of the gas probe and monitoring well VOC analysis and compares the results with MTCA B deep soil gas screening levels for VI. The results of the gas probe and monitoring well VOC analysis indicate the following:

- Acrolein was detected in all five samples and found above the MTCA Method B non-cancer screening level in three samples (GP-19, GP-18, and BH-07).
- Detected analytes found below screening levels include acetone, chloroform, ethylbenzene, tetrahydrofuran, and xylenes.
- No benzene, chlorobenzene, 1,4-dichlorobenzene, n-hexane, n-heptane, 1,2,4-trimethylbenzene, or vinyl chloride (other VOCs detected at the flare above MTCA B cleanup levels for air) were detected in the samples.
- 42 other VOCs were not detected and below the MTCA Method B cancer and non-cancer screening levels.

3.3.2.1 Acrolein

Acrolein was found above the non-cancer screening level of 0.91 µg/m^3 at GP-18, GP-19, and BH-07, and detected below the screening level at GP-14 and GP-15. This does not appear to be related to the property. Acrolein is a problematic compound known to be a false positive related to contamination

issues from the wall of the actual summa cannisters. EPA and others (2015) indicate acrolein can remain in canisters even through the cleaning process and can actually grow in concentrations over time between the time of sampling and time of analysis.

Parametrix contacted Friedman and Bruya, Inc. to discuss the results, and the laboratory noted that many other clients' samples were also showing detections of acrolein above the screening level. This indicates the acrolein identified above the screening levels are not verified and likely false positives not related to LFG at the property.

3.4 Conclusions of the Tier I Assessment

Based on the Preliminary and Tier I VI Assessments and as with similar types of closed landfills, VI is a potential risk to on-site and off-site buildings related to LFG migration and volatilization from groundwater. These are typical of similar types of closed landfills where compliance monitoring of LFG and groundwater are completed to ensure risks to human health and the environment are properly mitigated by engineering or institutional controls.

Results of the Tier I VI Assessment show LFG generated by the landfill is controlled by the LFG control system using a series of vertical and horizontal piping connected to the regenerative blower and LFG flare facility. LFG migration at McCollum Park is limited by the LFG control system and not detected in gas probes.

Similarly, the LFG control system removes VOCs that have volatilized from contaminated groundwater within its radius of influence and discharges these chemicals at the flare. Based on the Tier I VI Assessment, the primary VI pathway at the site would be related to volatilization from groundwater in areas outside the influence of the LFG control system.

4. TIER II ASSESSMENT

A Tier II Assessment was conducted that consisted of sampling and analysis of building sub-slab soil gas samples and comparing the results to screening criteria; sampling and analysis of building indoor air and comparing the results to indoor air criteria; and sampling of ambient air near the buildings. Methane was also measured at several locations to screen for LFG. The Tier II Assessment was performed by Aspect and EMB. The completed individual Tier II Assessments were approximately one month apart. Section 4 provides a summary of results. The complete individual assessments are in Appendix B – EMB Consulting - Preliminary Vapor Intrusion Assessment, McCollum Pioneer Park and Appendix C – Aspect Consulting - Draft Tier II Assessment Report, McCollum Park Site.

4.1 Sub-Slab Soil Gas Screening

Aspect performed sub-slab soil gas sampling of onsite buildings for the Snohomish County Parks and Recreation Department on April 27, 2021. This involved sampling sub-slab soil gas at seven locations:

- Two locations below the pool building (Pool-1-SG and Pool-2-SG).
- Two locations below the WSU Education Building (WSU-ED1-SG and WSU-ED2-SG).
- Two locations below the WSU Extension Building (ESU-EX1-SG and WSU-EX2-SG).
- One location below the BMX track building. (BMX-1-SG).

Figure 2 displays the seven locations across the site.

4.1.1 Sample Results

Samples were submitted for analysis of VOCs using EPA Method TO-15. Table 2 summarizes the results of the sub-slab soil gas sampling and compares the results to the MTCA Method B cancer and noncancer screening levels for VI from sub-slab soil gas.

- Acrolein was found above screening levels in two samples, Pool-1-SG and WSU-ED1-SG.
- Chloroform was found above screening levels in sample Pool-1-SG.
- Benzene, bromodichloromethane, methylene chloride, tetrahydrofuran, and xylenes were detected in samples but at concentrations below MTCA Method B screening levels.
- No chlorobenzene, 1,4-dichlorobenzene, n-hexane, n-heptane, 1,2,4-trimethylbenzene, or vinyl chloride (other VOCs detected at the flare above MTCA B cleanup levels for air) were detected in the samples.
- 37 other VOCs were not detected in samples and were below MTCA Method B screening levels for sub-slab soil gas.

Aspect also analyzed sub-slab soil gas samples for total petroleum hydrocarbons (TPH). Table 2 summarizes the TPH results. As noted in the table:

- TPH was detected at levels ranging from 712 to 1310 µg/m^3, below the MTCA Method B screening levels for sub-slab soil gas of 4700 µg/m^3.

4.1.1.1 Acrolein

Acrolein was found above the MTCA Method B non-cancer screening level of 0.91 µg/m^3 at Pool-1-SG and WSU-ED1-SG. As noted above, this does not appear to be related to the property and likely a false positive due to the summa canisters.

4.1.1.2 Chloroform

Chloroform was found above the MTCA Method B cancer screening level of 3.6 µg/m^3 at Pool-1-SG. Chloroform is another known false positive related to chlorinated water. Public swimming pools are a known source of chloroform; therefore, the result does not appear to be related to VI.

4.1.2 Methane

Aspect measured the methane concentration at each of the sub-slab soil gas locations. Methane was not detected (0.0% by volume) at any of the seven sub-slab soil gas locations.

4.2 Indoor Air Sampling

EMB performed indoor air sampling of three on-site buildings and collected six samples for VOC analysis for the Snohomish County Parks and Recreation Department in March 2021. In April 2021, Aspect performed indoor air sampling of five buildings at ten locations across the site.

EMB collected a total of six air samples from three buildings at the site with two samples from each building. Air samples were collected with summa canisters with calibrated regulators for a 24-hour sample collection event from March 9 to March 10, 2021.

- Sample 030921-Pool1 was collected from the lobby of the pool building.
- Sample 030921-Pool2 was collected from the women's locker room.
- Sample 030921-WSU1 was collected from an office in the northeast portion of the WSU Extension Building.
- Sample 030921-WSU2 was collected from an office in the southwest portion of the WSU Extension Building.
- Sample 030921-ED1 was collected from the west classroom of the WSU Education Building.
- Sample 030921-ED2 was collected from the east classroom of the WSU Education Building.

It should be noted that no ambient outdoor air samples were collected or submitted for analysis by EMB. This is typically done to confirm indoor air results are not the result of false positives related to ambient conditions. Traffic and air pollution are known sources of false positives that can affect indoor air quality samples in urban environments such as McCollum Park.

Aspect collected ten air samples from the five buildings. Samples were collected with summa canisters with calibrated regulators for an approximately 8-hour sampling event on April 26, 2021.

- Samples Pool-1-IA and Pool-2-IA were collected from the pool building.
- Samples WSU-EX1-IA and WSU-EX2-IA were collected from the WSU Extension Building.
- Samples WSU-ED1-IA and WSU-ED2-IA were collected from the WSU Education Building.
- Samples STREAM-1-IA, STREAM-2-IA, and STREAM-3-IA were collected from the Adopt-a-stream Building.
- Sample BMX-1-IA was collected from the BMX building.
- Ambient air samples were also collected from four locations and the indoor air results were then corrected for ambient air conditions.

Figure 2 displays the indoor air and ambient air sample locations across the site.

4.2.1 Sample Results

Sample results were compared to MTCA Method B cleanup levels for indoor air. Table 3 summarizes the results of the EMB and Aspect indoor air sampling.

- Acrolein was found above noncancer screening levels in all indoor air samples collected by Aspect.
- Benzene exceeded indoor air cancer cleanup levels in four Aspect samples and all of the EMB samples.
- 1,3 butadiene exceeded indoor air cancer cleanup levels in four EMB samples.
- Chloroform exceeded indoor air noncancer cleanup levels in two Aspect samples and all of the EMB samples.

- 1,4-dichlorobenzene exceeded indoor air cancer cleanup levels in two Aspect samples and four EMB samples.
- 1,2-dichloroethane exceeded indoor air noncancer cleanup levels in one Aspect sample and three EMB samples.
- Naphthalene exceeded indoor air cancer cleanup levels in all samples except for the BMX building.
- 1,2,4-trimethylbenzene was detected in two samples but at levels below MTCA Method B cleanup levels.
- No chlorobenzene, n-hexane, n-heptane, or vinyl chloride (other VOCs detected at the flare above MTCA B cleanup levels for air) were detected in the samples.

As noted in the table, seven analytes were found above MTCA Method B cancer cleanup levels for indoor air. Several of these chemicals are common analytes found in ambient air or from conditions not related to VI.

Aspect also analyzed indoor air samples for TPH. Table 3 summarizes the TPH results. As noted in the table:

- TPH was found above indoor air cleanup levels in both pool building samples (Pool-1-IA, Pool-2-IA) and one of the WSU Education Building samples (WSU-ED2-IA) after corrections for ambient air.

4.2.1.1 Acrolein

Acrolein was found above the MTCA Method B non-cancer screening level of 0.91 µg/m^3 at Pool-1-SG and WSU-ED1-SG. As noted above, this does not appear to be related to the property and is likely a false positive due to the summa canisters.

4.2.1.2 Benzene, Naphthalene, 1,3-Butadiene, and 1,2-Dichloroethane

Benzene and naphthalene are typically related to concentrations occurring from outdoor ambient air conditions related to vehicle exhaust. Similarly, 1,2-dichloroethane is commonly found in vehicle exhaust and tobacco smoke. 1,3-Butadiene is a common false positive related to isobutylene, another common gasoline constituent, as well as a main precursor to synthetic rubber.

4.2.1.3 Chloroform

Chloroform is a common VI false positive related to use of chlorinated water.

4.2.1.4 1,4-Dichlorobenzene

1,4-Dichlorobenzene is a common fumigant used to control mildew and mold as well as being used as an insecticide. However, this chemical was also present within the LFG sample. It is likely a VI false positive, not related to landfill gas, and was not detected in the sub-slab soil gas samples.

4.2.1.5 Total Petroleum Hydrocarbons

TPH was found above indoor air cleanup levels in three samples. TPH is a common VI false positive related to ambient air and poor circulation. As noted above, no TPH was identified above screening levels in sub-slab soil gas indicating the TPH is not due to VI from the subsurface.

4.2.2 Methane

Aspect measured methane concentrations at each of the indoor air and ambient air sampling locations. No methane was detected at any of the sampling locations (0.0% by volume). These results were consistent with the sub-slab soil gas and deep soil gas (gas probe) screening results.

4.3 Conclusions of the Tier II Assessment

EMB concluded that it was possible landfill gas was impacting indoor air quality of the buildings and that further investigation was warranted. Aspect conducted the further investigation including sub-slab soil gas analysis, ambient air analysis, and indoor air analysis. Aspect concluded the Tier II Assessment indicating that indoor air cleanup level exceedances did not correspond with sub-slab soil gas screening levels suggesting that the source of the indoor air contamination is not likely due to VI from the former landfill. Aspect's conclusions in the Tier II Assessment correlate with the Parametrix findings from the Tier I Assessment as the indoor air cleanup level exceedances do not correspond with the LFG as a source or contaminated groundwater as a source. The indoor air cleanup level exceedances were concluded to be from ambient air or from within the buildings themselves.

5. FINAL VI EVALUATION

Groundwater is extremely shallow at the southern portion of the landfill near several of the on-site buildings. There is limited vadose zone available for LFG to migrate and the LFG collection system is reducing the LFG from that small vadose zone. Therefore, the shallow groundwater, along with the LFG collection system, appear to be acting as a curtain to prevent LFG migration from the landfill from causing VI of the buildings.

The VOCs detected in the LFG were benzene, chlorobenzene, cyclohexane, 1,4-dichlorobenzene, ethylbenzene, n-heptane, n-hexane, 1,2,4-trimethylbenzene, vinyl chloride, and xylenes (Table 1). Groundwater present beyond the LFG collection system contains concentrations of vinyl chloride above the groundwater to vapor MTCA Method B cancer screening levels. However, as noted above, no vinyl chloride was detected in any of the deep soil gas, sub-slab soil gas, or indoor air samples (Tables 2 and 3).

Of the LFG components, only benzene and 1,4-dichlorobenzene were found above cleanup levels in indoor air samples (Table 3). These chemicals were not found above screening levels in either deep soil gas or sub-slab soil gas samples (Table 2) indicating their source is not from VI of LFG.

The indoor air cleanup level exceedances (Table 3) do not correlate with the deep soil gas or sub-slab soil gas (Table 2) and don't have a chemistry matching the LFG (Table 1). It appears indoor air cleanup level exceedances are not a result of VI and are related to false positives, poor ambient air quality, poor ventilation, or household/office products and chemicals.

During this study, methane was measured at the landfill flare, at four of the five gas probes (GP-14, GP-15, GP-18, and GP-19), one monitoring well (BH-07), seven sub-slab soil gas locations (Pool-1-SG, Pool-2-SG, WSU-ED1-SG, WSU-ED2-SG, WSU-EX1-SG, WSU-EX2-SG, and BMX-1-SG), and fourteen indoor/outdoor air locations (Pool-1-IA, Pool-2-IA, Pool-AA, WSU-ED1-IA, WSU-ED2-IA, WSU-EX1-IA, WSU-EX2-IA, WSU-AA, BMX-1-IA, BMX-AA, Stream-1-IA, Stream-2-IA, Stream-3-IA, and Stream-AA). Methane was not detected at any of the measurement locations except for the landfill flare.

Engineering controls (LFG extraction) and physical conditions (high groundwater) are controlling VI risk related to the Emander Landfill. Methane migration is routinely monitored by the County in accordance with the Cleanup Action Plan

Barometric changes do not appear to affect the results of compliance monitoring as LFG migration is controlled by the extraction system.

Groundwater to vapor is the only pathway not currently controlled, and vinyl chloride is the only VOC in groundwater that currently exceeds VI screening levels. Air from Well BH-07 was sampled as representative of the groundwater to vapor pathway (and as deep soil gas), and although groundwater concentrations of vinyl chloride exceed the screening level in this well, vinyl chloride was not detected in the air sample. Similarly, vinyl chloride was not detected in any of the deep soil gas, sub-slab soil gas, indoor air, or ambient air samples completed for this study. These results indicate that although vinyl chloride concentrations in groundwater exceed the groundwater to vapor screening criteria, this pathway is not currently complete at the site.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

One LFG sample, five deep soil gas samples, seven sub-slab soil gas samples, sixteen indoor air samples, and four ambient air samples were collected and analyzed for VOCs using EPA Method TO-15 to evaluate potential VI at the McCollum Park / Emander Landfill site. Indoor air cleanup level exceedances of chemicals at the McCollum Park / Emander Landfill site are not consistent with the chemistry of sources of LFG or the groundwater to vapor pathway. VOCs in sub-slab soil gas were also below MTCA Method B screening levels indicating indoor air cleanup level exceedances are not related to VI. VI risk from the Emander Landfill appears to be minimal based upon the engineering controls and physical conditions at the site which include an active LFG control system and very shallow water table / limited vadose zone. Based upon the findings, no further investigation of VI related to the current state of the landfill appears warranted beyond continued compliance monitoring and assessment as part of the cleanup action plan and remedial actions under MTCA.

6.2 Recommendations

Testing for VOCs using summa canisters was completed as a one-time event. Vapor pressure changes can have significant effects on the migration of contaminants through VI (i.e. low static pressure conditions may increase VI). At the McCollum Park / Emander Landfill, VI risk is best evaluated by measurement of methane which is the primary component of LFG. For landfills, methane is the best tracer contaminant to evaluate potential VI.

If not already implemented at the site, it may be prudent to install methane detectors within on-site buildings. This would be a safety feature to protect against LFG collection system malfunction so that occupants would be alerted if LFG were to VI into the buildings.

Similarly, it may be prudent to evaluate the locations of existing gas probes for compliance monitoring. Some of the existing probes located in areas with high groundwater may not be suitable for monitoring LFG, and therefore installation of additional gas probes in other locations to monitor LFG conditions near on-site buildings should be considered.

Vinyl chloride concentrations in groundwater should continue to be evaluated to confirm continuation of the observed downward trends. If a slug source such as the event in 2014 is identified in routine groundwater monitoring (i.e., extremely high concentrations outside of the normal trend) it may be prudent to reevaluate the pathway by collecting additional air samples for VOCs (barhole study, sub-slab samples, or head space of existing wells) to confirm the new conditions do not alter the results of this study.

7. REFERENCES

AGI Technologies. 1996. Final Cleanup Action Plan, McCollum Park/Emander Landfill, Snohomish County, Washington. Prepared for Washington Department of Ecology. April.

Aspect Consulting, LLC. 2021. Draft Tier II Assessment Report, McCollum Park Site, prepared for Snohomish County. June 4.

Ecology (Washington State Department of Ecology). 2013. Model Toxics Control Act Regulation and Statute, Ecology publication no 94-06, available online at https://apps.ecology.wa.gov/publications/SummaryPages/9406.html

Ecology. 2018. Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Ecology publication No 09-09-047, available online at https://apps.ecology.wa.gov/publications/SummaryPages/0909047.html

Ecology. 2020. Document Repository for McCollum Park, Cleanup site ID 3992, available online at https://apps.ecology.wa.gov/gsp/CleanupSiteDocuments.aspx?csid=3992

Ecology. 2021. Cleanup Levels and Risk Calculations, available online at https://www.ezview.wa.gov/Portals/_1987/Documents/Documents/CLARC_Master.xlsx

EMB Consulting, LLC. 2021. Preliminary Vapor Intrusion Assessment, McCollum Pioneer Park, prepared for Snohomish County. April 1.

EPA (U.S. Environmental Protection Agency) and others. 2015. Improving the analysis of acrolein in ambient air, presentation at the National Air Toxics Monitoring and Data Analysis Workshop October 2015; available online at https://www.epa.gov/sites/production/files/2021-03/documents/improving_the_analysis_of_acrolein_in_ambient_air.pdf

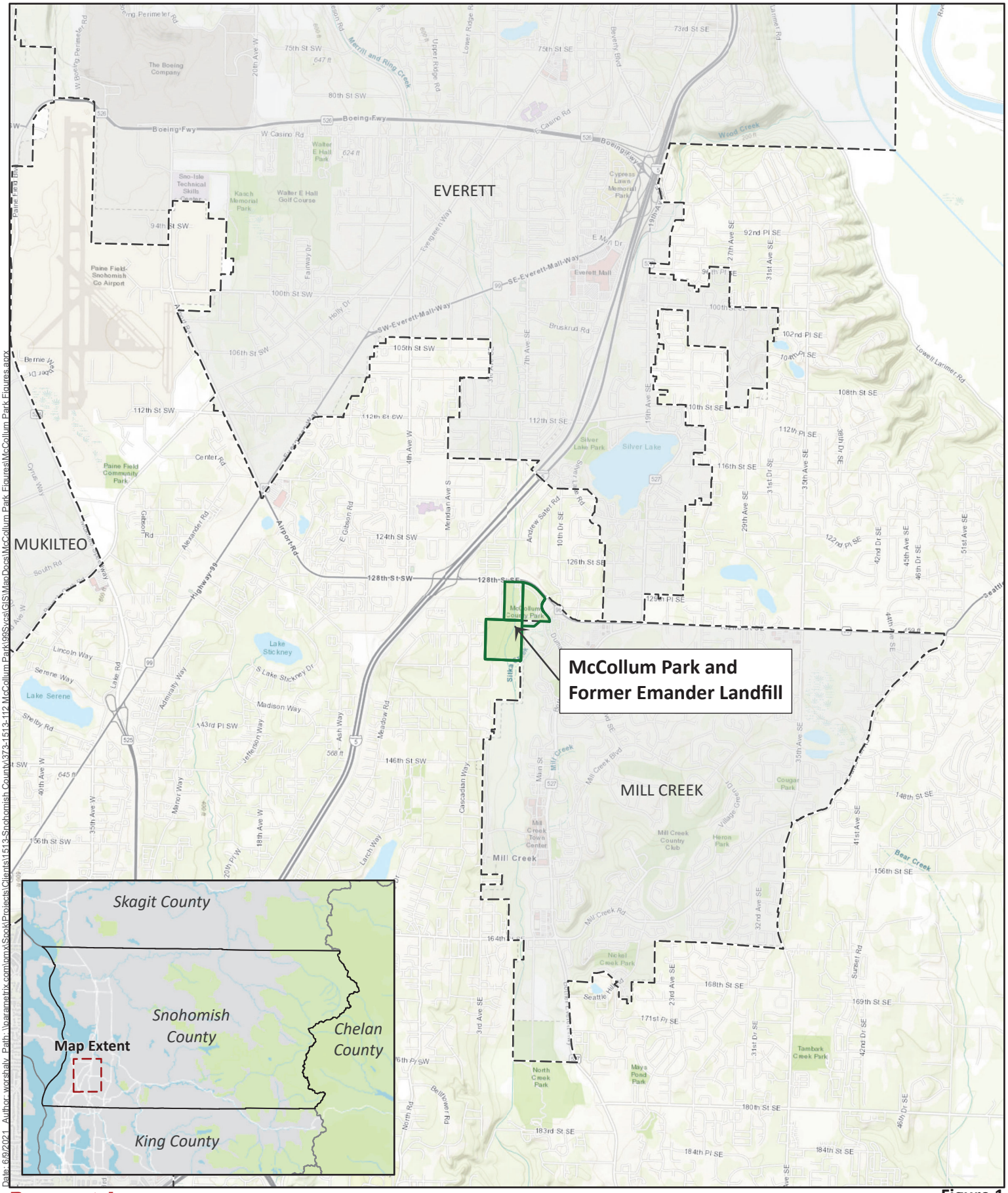
Minard, J.P. 1985. The Geologic Map of the Everett 7.5-minute Quadrangle, US Geological Survey Miscellaneous Field Studies Map 1748, available online at https://pubs.er.usgs.gov/publication/mf1748

Parametrix, Inc. 2021. Technical Memorandum: McCollum Park & Emander Landfill Vapor Intrusion Screening, prepared for the Snohomish County Department of Public Works Solid Waste Division. June.

Snohomish County Public Works (Snohomish County. 2018. McCollum Park (Former Emander Landfill) – Request for Agreed Order Completion and Reduction of Groundwater Monitoring Frequency, as submitted to Ching-Pi Wang of the Washington State Department of Ecology

This Page Intentionally Left Blank

Figures



Date: 6/9/2021 Author: worshalv Path: \\parametrix.com\om\xSpok\Projects\Clients\1513-Snohomish County\373-1513-112 McCollum Park\99Svcs\GIS\MapDocs\McCollum Park Figures\McCollum Park Figures.aprx

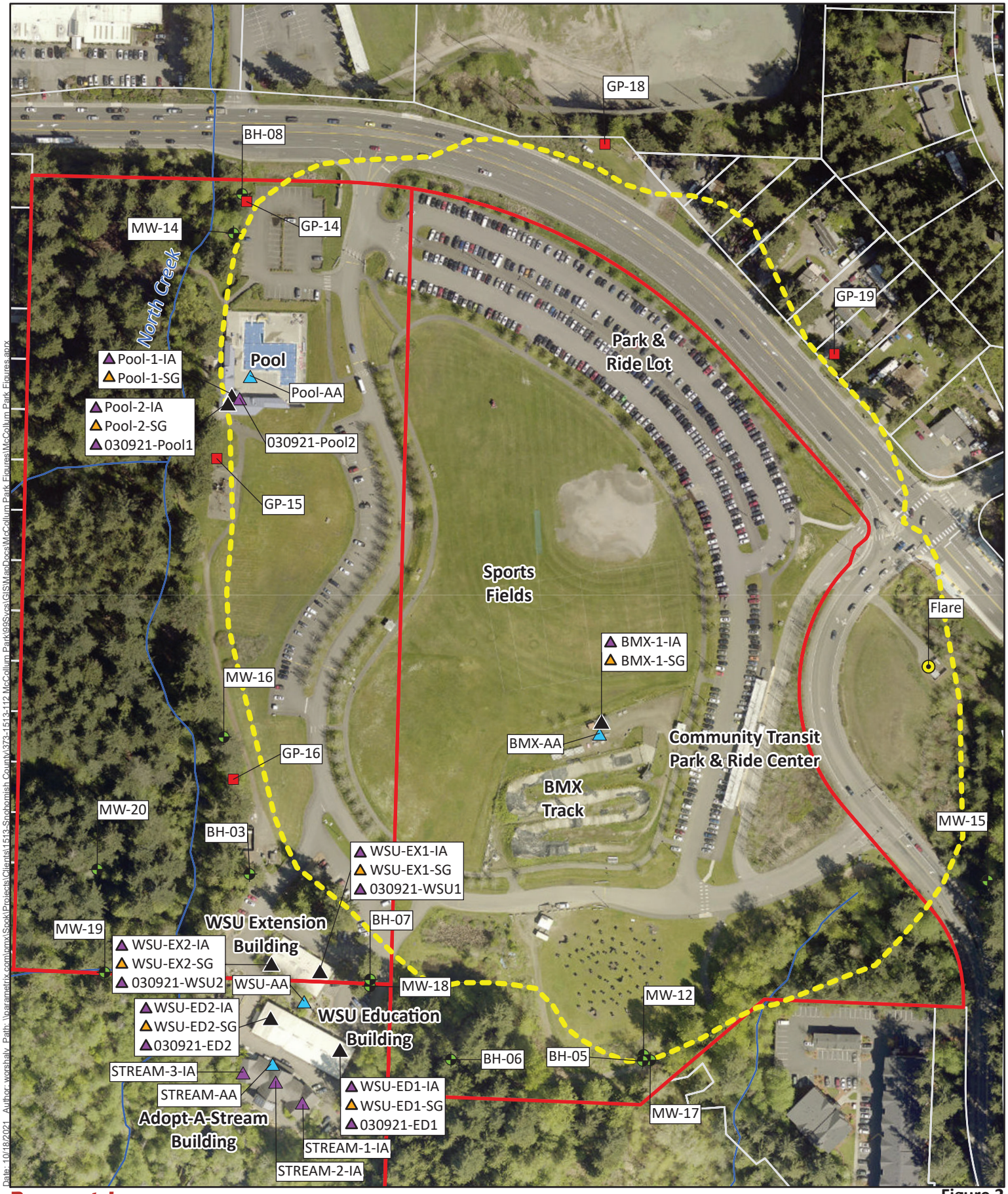
Parametrix

McCollum Park Parcel
City Boundary

0 0.25 0.5 1 Miles

Figure 1
Site Location Map
McCollum Park and Emander Landfill

Snohomish County, WA



Date: 10/18/2021 Author: worshalv Path: \\parametrix.com\pmx\Spok\Projects\Clients\1513-Snohomish County\373-1513-112 McCollum Park\99Svcs\GIS\MapDocs\McCollum Park Figures\McCollum Park Figures.aprx

Parametrix

Sample Locations
- Ambient Air
- Indoor Air
- Sub-Slab Soil Gas
- Multiple
- Flare
- Gas Probe
- Monitoring Well
- Stream
- Emander Landfill Extent (approx.)
- McCollum Park Parcel
- Parcel Boundary

0 50 100 200 Feet

Figure 2
Site Detail Map
McCollum Park and Emander Landfill

Snohomish County, WA

Tables

Table 1. McCollum Park & Emander Landfill: Groundwater to Vapor and Landfill Gas to Vapor Screening

	Groundwater to Vapor				Landfill Gas to Vapor		
Analyte	Groundwater Screening Level Method B Noncancer (µg/L)	Groundwater Screening Level Method B Cancer (µg/L)	Highest Concentration at Landfill[1] (2013-2021) (µg/L)	Highest Concentration at Landfill Recent Data Only[1] (2019 - 2020)	Air Method B Noncancer Cleanup Level (µg/m³)	Air Method B Cancer Cleanup Level (µg/m³)	Flare[2] (µg/m³)
acetone	1.50E+07		**12.10**	N/A	1.40E+04		<470
acrolein	2.90E+00		NT	N/A	9.10E-03		<11
benzene	1.00E+02	2.40E+00	**4.00**	**<1.0**	1.40E+01	3.20E-01	**160**
benzyl chloride	5.60E+01	6.20E+00	NT	N/A	4.60E-01	5.10E-02	<5.1
bromodichloromethane		1.80E+00	<0.39	N/A		6.80E-02	<6.6
bromoform		2.20E+02	<1.0	N/A		2.30E+00	<200
bromomethane	1.30E+01		<1.0	N/A	2.30E+00		<230
butadiene;1,3-	4.20E-01	3.80E-02	NT	N/A	9.10E-01	8.30E-02	<4.3
carbon disulfide	4.00E+02		<1.0	N/A	3.20E+02		<610
carbon tetrachloride	6.10E+01	5.60E-01	<0.39	N/A	4.60E+01	4.20E-01	<31
chlorobenzene	2.90E+02		**3.36**	N/A	2.30E+01		**290**
chloroform	4.90E+02	1.20E+00	<1.0	N/A	4.50E+01	1.10E-01	<4.8
chloromethane	1.50E+02		**12.20**	N/A	4.10E+01		<360
cumene (isopropylbenzene)	9.10E+02		NT	N/A	1.80E+02		<240
cyclohexane	7.50E+02		NT	N/A	2.70E+03		**800**
dichlorobenzene;1,2-	2.50E+03		<2.1	N/A	9.10E+01		<59
dichlorobenzene;1,4-	7.90E+03	4.90E+00	<2.1	N/A	3.70E+02	2.30E-01	**210**
dichloroethane;1,1-		1.10E+01	<1.0	N/A		1.60E+00	<40
dichloroethane;1,2- (EDC)	1.40E+02	4.20E+00	<0.65	N/A	3.20E+00	9.60E-02	<4.0
dichloroethylene;1,1-	1.30E+02		<1.0	N/A	9.10E+01		<39
dichloropropane;1,2-	2.80E+01	1.00E+01	<7.8	N/A	1.80E+00	6.80E-01	<23
dioxane;1,4-	1.30E+05	4.70E+03	NT	N/A	1.40E+01	5.00E-01	<35
ethyl acetate	1.00E+04		NT	N/A	3.20E+01		<710
ethylbenzene	2.80E+03		<1.0	N/A	4.60E+02		**280**
ethylene dibromide (EDB)	2.90E+02	3.00E-01	**0.30 J**	<0.01	4.10E+00	4.20E-03	<7.5
heptane;n-	4.00E+00		NT	N/A	1.80E+02		**730**
hexachlorobutadiene		8.00E-01	<2.1	N/A		1.10E-01	<21
hexane;n-	7.20E+00		NT	N/A	3.20E+02		**960**
hexanone;2-	7.30E+03		<5.0	N/A	1.40E+01		<400
methyl ethyl ketone (2-butanone)	1.70E+06		<5.0	N/A	2.30E+03		<290
methyl methacrylate	5.00E+04		NT	N/A	3.20E+02		<400
methyl tert-butyl ether (MTBE)	1.20E+05	8.60E+02	NT	N/A	1.40E+03	9.60E+00	<180
methylene chloride	4.80E+03	1.20E+03	**3.50**	N/A	2.70E+02	6.60E+01	<3,400
naphthalene	1.70E+02	8.90E+00	<2	N/A	1.40E+00	7.40E-02	<26
propylbenzene;n-	2.30E+03		NT	N/A	4.60E+02		<240
styrene	8.10E+03		<1.0	N/A	4.60E+02		<83
tetrachloroethane;1,1,2,2-		6.20E+00	<1.0	N/A		3.40E-01	<13
TETRACHLOROETHYLENE (PCE)	4.60E+01	2.40E+01	<10.4	N/A	1.80E+01	9.60E+00	<660
tetrahydrofuran	5.20E+05		NT	N/A	9.10E+02		<30
toluene	1.50E+04		**2.30**	N/A	2.30E+03		<1,800
trichlorobenzene;1,2,4-	3.80E+01		<2.1	N/A	9.10E-01		<73
trichloroethane;1,1,1-	5.40E+03		<1.0	N/A	2.30E+03		<53
trichloroethane;1,1,2-	4.60E+00	7.90E+00	<1.0	N/A	9.10E-02	1.60E-01	<5.3
TRICHLOROETHYLENE (TCE)	3.80E+00	1.40E+00	<1.0	N/A	9.10E-01	3.30E-01	<11
trichlorofluoromethane	1.20E+02		<1.0	N/A	3.20E+02		<220
trimethylbenzene;1,2,4-	2.40E+02		NT	N/A	2.70E+01		**440**
trimethylbenzene;1,3,5-	1.70E+02		NT	N/A	2.70E+01		<240
vinyl acetate	7.80E+03		<5.0	N/A	9.10E+01		<690
vinyl chloride	5.50E+01	3.40E-01	**87.80**	**5.00**	4.60E+01	2.80E-01	**110**
xylenes	3.20E+02		**1.20**	N/A	4.60E+01		**344**

Bold indicates analyte detected

Bold & Shaded indicates value reported above MTCA Method B screening level

N/A Not Analyzed

NT Not Tested

1 Ecology EIM data, May 2020, https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=92140

2 Sample collected by Parametrix, April 2021

Notes: Table includes only VOC chemicals reported in Ecology Cleanup Levels and Risk Calculations for air/vapor intrusion toxics

This Page Intentionally Left Blank

Table 2. McCollum Park and Emander Landfill: Deep Soil Gas and Sub-Slab Soil Gas Vapor Intrusion Screening

	Deep Soil Gas							Sub-Slab Soil Gas							
Analyte	Deep Soil Gas Screening Level Method B Noncancer (µg/m³)	Deep Soil Gas Screening Level Method B Cancer (µg/m³)	GP-14[1] (µg/m³)	GP-15[1] (µg/m³)	GP-19[1] (µg/m³)	GP-18[1] (µg/m³)	BH-07[1] (µg/m³)	Sub-Slab Soil Gas Screening Level Method B Noncancer (µg/m³)	Sub-Slab Soil Gas Screening Level Method B Cancer	POOL-1-SG[2] (µg/m³)	POOL-2-SG[2] (µg/m³)	WSU-ED1-SG[2] (µg/m³)	WSU-ED2-SG[2] (µg/m³)	WSU-EX1-SG[2] (µg/m³)	WSU-EX2-SG[2] (µg/m³)	BMX-1-SG[2] (µg/m³)
acetone	1.40E+06		**44**	**49**	**37**	<28	<27	470000		**380 E**	830 E	**45**	**140**	**75**	<40	46
acrolein	9.10E-01		**0.73**	**0.89**	**1.1**	**1.2**	**2.5**	0.3		**1.3**	<0.63	**0.78**	<0.65	<0.68	<0.97	<0.6
benzene	1.40E+03	3.20E+01	<1.8	<1.9	<1.9	<1.9	<1.8	4.60E+02	1.10E+01	**2.8**	<1.8	<1.8	<1.8	<1.9	<2.7	<1.7
benzyl chloride	4.60E+01	5.10E+00	<0.28	<0.31	<0.30	<0.31	<0.30	1.50E+01	1.70E+00	<0.29	<0.28	<0.28	<0.3	<0.31	<0.44	<0.27
bromodichloromethane		6.80E+00	<0.37	<0.40	<0.39	<0.40	<0.38		2.3	**1.5**	<0.37	<0.37	<0.38	<0.4	<0.57	<0.35
bromoform		2.30E+02	<11	<12	<12	<12	<12		76	<12	<11	<11	<12	<12	<18	<11
bromomethane	2.30E+02		<13	<14	<14	<14	<13	7.60E+01		<13	<13	<13	<13	<14	<20	<12
butadiene;1,3-	9.10E+01	8.30E+00	<0.24	<0.27	<0.26	<0.26	<0.25	3.00E+01	2.80E+00	<0.25	<0.24	<0.24	<0.25	<0.26	**<0.38**	<0.23
carbon disulfide	3.20E+04		<34	<37	<36	<37	<36	1.10E+04		<35	<34	<34	<36	<37	<53	<32
carbon tetrachloride	4.60E+03	4.20E+01	<1.7	<1.9	<1.8	<1.9	<1.8	1.50E+03	1.40E+01	<1.8	**<1.7**	**<1.7**	**<1.8**	<1.9	**<2.7**	<1.6
chlorobenzene	2.30E+03		<2.5	<2.8	<2.7	<2.7	<2.6	7.60E+02		<2.6	<2.5	<2.5	<2.6	<2.7	<3.9	<2.4
chloroform	4.50E+03	1.10E+01	**0.4**	**1.2**	**1.1**	**2.6**	<0.28	1.50E+03	3.60E+00	**46**	**2.6**	**<0.27**	**<0.28**	**0.52**	**1**	**0.3**
chloromethane	4.10E+03		<20	<22	<22	<22	<21	1.50E+02		<21	<20	<20	<21	<22	<32	<19
cumene (isopropylbenzene)	1.80E+04		<14	<15	<14	<15	<14	9.10E+02		<14	<14	<14	<14	<15	<21	<13
cyclohexane	2.70E+05		<38	<41	<40	<41	<39	7.50E+02		<39	<38	<38	<39	<41	<59	<36
dichlorobenzene;1,2-	9.10E+03		<3.3	<3.6	<3.5	<3.5	<3.4	2.50E+03		<3.4	<3.3	<3.3	<3.4	<3.5	<5.1	<3.1
dichlorobenzene;1,4-	3.70E+04	2.30E+01	<1.3	<1.4	<1.4	<1.4	<1.4	7.90E+03	4.90E+00	<1.3	<1.3	<1.3	<1.4	<1.4	<2	<1.2
dichloroethane;1,1-		1.60E+02	<2.2	<2.4	<2.3	<2.4	<2.3		1.10E+01	<2.2	<2.2	<2.2	<2.3	<2.3	<3.4	<2.1
dichloroethane;1,2- (EDC)	3.20E+02	9.60E+00	<0.22	<0.24	<0.23	<0.24	<0.23	1.40E+02	4.20E+00	<0.23	<0.22	<0.22	<0.23	<0.24	<0.34	<0.21
dichloroethylene;1,1-	9.10E+03		<2.2	<2.4	<2.3	<2.3	<2.3	1.30E+02		<2.2	<2.2	<2.2	<2.3	<2.3	<3.4	<2.1
dichloropropane;1,2-	1.80E+02	6.80E+01	<1.3	<1.4	<1.3	<1.4	<1.3	2.80E+01	1.00E+01	<1.3	<1.3	<1.3	<1.3	<1.4	<2	<1.2
dioxane;1,4-	1.40E+03	5.00E+01	<2.0	<2.2	<2.1	<2.1	<2.1	1.30E+05	4.70E+03	<2	<2	<2	<2.1	<2.1	<3.1	<1.9
ethyl acetate	3.20E+03		<40	<43	<42	<43	<41	1.00E+04		<40	<40	<40	<41	<43	<61	<37
ethylbenzene	4.60E+04		**7.6**	**5.9**	**4.4**	**4.1**	**3**	2.80E+03		<2.4	<2.4	<2.4	**<2.5**	<2.6	<3.7	<2.3
ethylene dibromide (EDB)	4.10E+02	4.20E-01	<0.42	<0.46	<0.45	<0.45	<0.44	2.90E+02	3.00E-01	<0.43	<0.42	<0.42	<0.44	<0.45	<0.65	<0.4
heptane;n-	1.80E+04		<23	<25	<24	<24	<23	4.00E+00		<23	<23	<23	<23	<24	<35	<21
hexachlorobutadiene		1.10E+01	<1.2	<1.3	<1.2	<1.3	<1.2		8.00E-01	<3	<3	<3	<3	<3.1	<4.5	<2.8
hexane;n-	3.20E+04		<19	<21	<20	<21	<20	7.20E+00		<20	<19	<19	<20	<21	<30	<18
hexanone;2-	1.40E+03		<23	<25	<24	<24	<23	7.30E+03		<23	<23	<23	<23	<24	<35	<21
methyl ethyl ketone (2-butanone)	2.30E+05		<16	<18	<17	<17	<17	1.70E+06		<17	<16	<16	<17	<17	<25	<15
methyl methacrylate	3.20E+04		<23	<25	<24	<24	<23	5.00E+04		<23	<23	<23	<23	<24	<35	<21
methyl tert-butyl ether (MTBE)	1.40E+05	9.60E+02	<9.9	<11	<10	<11	<10	1.20E+05	8.60E+02	<10	<9.9	<9.9	<10	<11	<15	<9.4
methylene chloride	2.70E+04	6.60E+03	<190	<210	<200	<200	<200	4.80E+03	1.20E+03	**670 CE**	**<190**	210 C	**<200**	<200	<300	190 C
naphthalene	1.40E+02	7.40E+00	<1.4	<1.6	<1.5	<1.5	<1.5	1.70E+02	8.90E+00	<1.5	<1.4	<1.4	<1.5	<1.5	<2.2	<1.4
propylbenzene;n-	4.60E+04		<14	<15	<14	<15	<14	2.30E+03		<14	<14	<14	<14	<15	<21	<13
styrene	4.60E+04		<4.7	<5.1	<4.9	<5.0	<4.9	2.30E+03		<4.8	<4.7	<4.7	<4.9	<5	<7.2	<4.4
tetrachloroethane;1,1,2,2-		4.30E+00	<0.76	<0.82	<0.80	<0.81	<0.78		6.20E+00	<0.77	<0.76	<0.76	<0.78	<0.81	<1.2	<0.71
TETRACHLOROETHYLENE (PCE)	1.80E+03	9.60E+02	<37	<41	<39	<40	<39	4.60E+01	2.40E+01	<38	<37	<37	<39	<40	<58	<35
tetrahydrofuran	9.10E+04		<1.7	**11**	<1.8	<1.8	<1.8	5.20E+05		**17**	**15**	**6.7**	**6.3**	**12**	**12**	**12**

Table 2. McCollum Park and Emander Landfill: Deep Soil Gas and Sub-Slab Soil Gas Vapor Intrusion Screening

	Deep Soil Gas							Sub-Slab Soil Gas								
Analyte	Deep Soil Gas Screening Level Method B Noncancer (µg/m³)	Deep Soil Gas Screening Level Method B Cancer (µg/m³)	GP-14[1] (µg/m³)	GP-15[1] (µg/m³)	GP-19[1] (µg/m³)	GP-18[1] (µg/m³)	BH-07[1] (µg/m³)	Sub-Slab Soil Gas Screening Level Method B Noncancer (µg/m³)	Sub-Slab Soil Gas Screening Level Method B Cancer	POOL-1-SG[2] (µg/m³)	POOL-2-SG[2] (µg/m³)	WSU-ED1-SG[2] (µg/m³)	WSU-ED2-SG[2] (µg/m³)	WSU-EX1-SG[2] (µg/m³)	WSU-EX2-SG[2] (µg/m³)	BMX-1-SG[2] (µg/m³)
toluene	2.30E+05		<100	<110	<110	<110	<110	1.50E+04		<110	<100	<100	<110	<110	<160	<98
trichlorobenzene;1,2,4-	9.10E+01		<4.1	<4.5	<4.3	<4.4	<4.2	3.80E+01		<4.2	<4.1	<4.1	<4.2	<4.4	<6.3	<3.9
trichloroethane;1,1,1-	2.30E+05		<3.0	<3.3	<3.2	<3.2	<3.1	5.40E+03		<3.1	<3	<3	<3.1	<3.2	<4.6	<2.8
trichloroethane;1,1,2-	9.10E+00	1.60E+01	<0.30	<0.33	<0.32	<0.32	<0.31	4.60E+00	7.90E+00	<0.31	<0.3	<0.3	<0.31	<0.32	<0.46	<0.28
TRICHLOROETHYLENE (TCE)	9.10E+01	3.30E+01	<0.59	<0.64	<0.62	<0.63	<0.61	3.80E+00	1.40E+00	<0.6	<0.59	<0.59	<0.61	<0.63	<0.91	<0.56
trichlorofluoromethane	3.20E+04		<12	<13	<13	<13	<13	1.20E+02		<13	<12	<12	<13	<13	<19	<12
trimethylbenzene;1,2,4-	2.70E+03		<14	<15	<14	<15	<14	2.40E+02		<14	<14	<14	<14	<15	<21	<13
trimethylbenzene;1,3,5-	2.70E+03		<14	<15	<14	<15	<14	1.70E+02		<14	<14	<14	<14	<15	<21	<13
vinyl acetate	9.10E+03		<39	<42	<41	<42	<40	7.80E+03		<39	<39	<39	<40	<42	<60	<37
vinyl chloride	4.60E+03	2.80E+01	<1.4	<1.5	<1.5	<1.5	<1.5	5.50E+01	3.40E-01	<1.4	<1.4	<1.4	<1.5	<1.5	<2.2	<1.3
xylenes	4.60E+03		**49**	**33.7**	**24.4**	**27**	**19.2**	3.20E+02		11.6	12.2	<4.8	<5	<5.1	<7.4	<4.5
Total Petroleum Hydrocarbons	1.40E+04		NT	NT	NT	NT	NT	4.70E+03		**1200**	**1310**	796	**712**	**742**	**1030**	**745**

Bold indicates analyte detected

Bold & Shaded indicates value reported above MTCA Method B screening level

E Denotes reported value is an estimate

NT Not Tested

C Not verified and may be due to carryover from previous sample injections.

1 Sample collected by Parametrix, April 2021

2 Sample collected by Aspect Consulting LLC, April 2021

Notes: Table includes only VOC chemicals reported in Ecology Cleanup Levels and Risk Calculations for air/vapor intrusion toxics

Table 3. McCollum Park and Emander Landfill: Vapor Intrusion Indoor Air Cleanup Level Comparison

Analyte	Indoor Air Cleanup Level Method B Noncancer (µg/m³)	Indoor Air Cleanup Level Method B Cancer (µg/m³)	Indoor Air															
			BMX-1-IA[1] (corrected) (µg/m³)	POOL-1-IA[1] (corrected) (µg/m³)	POOL-2-IA[1] (corrected) (µg/m³)	WSU-EX1-IA[1] (corrected) (µg/m³)	WSU-EX2-IA[1] (corrected) (µg/m³)	WSU-ED1-IA[1] (corrected) (µg/m³)	WSU-ED2-IA[1] (corrected) (µg/m³)	STREAM-1-IA[1] (corrected) (µg/m³)	STREAM-2-IA[1] (corrected) (µg/m³)	STREAM-3-IA[1] (corrected) (µg/m³)	30921-Pool1[2] (µg/m³)	30921-Pool2[2] (µg/m³)	30921-WSU1[2] (µg/m³)	30921-WSU2[2] (µg/m³)	30921-Ed1[2] (µg/m³)	30921-Ed2[2] (µg/m³)
acetone	14171.43		**3.5**	ND	ND	**1**	**3.8**	**1.4**	**0.4**	**15**	**2.2**	**8**	<4.8	<6.7	**7.4**	**9.6**	**8.1**	<4.8
acrolein	0.0091		**0.35**	**0.32**	**0.15**	**0.25**	**0.33**	**0.29**	**0.38**	**0.96**	**0.47**	**0.68**	<2.1	<2.9	<2.1	<2.1	<2.1	<2.1
benzene	13.71	0.321	ND	**3.3**	**3.4**	ND	ND	**0.68**	**1.08**	ND	ND	ND	**4**	**2.6**	**0.92**	**0.87**	**2.1**	**0.89**
benzyl chloride	0.457	0.051	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.052	<0.072	<0.052	<0.052	<0.052	<0.052
bromodichloromethane		0.068	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.067	<0.094	<0.067	<0.067	<0.067	<0.067
bromoform		2.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.1	<2.9	<2.1	<2.1	<2.1	<2.1
bromomethane	2.28		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.3	<3.3	<2.3	<2.3	<2.3	<2.3
butadiene;1,3-	0.914	0.083	ND	ND	ND	**0.025**	ND	ND	ND	**0.066**	**0.018**	ND	<0.044	<0.062	**0.21**	**0.18**	**0.23**	**0.17**
carbon disulfide	320		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<6.2	<8.7	<6.2	<6.2	<6.2	<6.2
carbon tetrachloride	45.714	0.417	**-0.01**	**0.02**	**0.02**	**0**	**0**	**0**	**0.01**	**0.06**	**-0.01**	**0.01**	**0.4**	<0.44	**0.42**	**0.4**	**0.4**	**0.4**
chlorobenzene	22.85		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.46	<0.64	<0.46	<0.46	<0.46	<0.46
chloroform	0.11		**0**	**0.052**	**0.052**	**0.047**	**0.117**	**0.015**	**0.027**	**0.192**	**0.042**	**0.015**	**0.24**	**0.23**	**0.2**	**0.21**	**0.17**	**0.15**
chloromethane	41.14285714		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<3.7	<5.2	<3.7	<3.7	<3.7	<3.7
cumene (isopropylbenzene)	182.8571429		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.5	<3.4	<2.5	<2.5	<2.5	<2.5
cyclohexane	2742.857143		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<6.9	<9.6	<6.9	<6.9	<6.9	<6.9
dichlorobenzene;1,2-	91.42857143		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.6	<0.84	<0.6	<0.6	<0.6	<0.6
dichlorobenzene;1,4-	365.7142857	0.227272727	ND	**0.87**	**0.61**	ND	ND	ND	ND	ND	ND	ND	**5.9**	**3.6**	**0.57**	**1.2**	<0.23	<0.23
dichloroethane;1,1-	1.5625		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.4	<0.57	<0.4	<0.4	<0.4	<0.4
dichloroethane;1,2- (EDC)	3.2	0.096153846	ND	**0.004**	**0.004**	**0.139**	**0.069**	**0.008**	**-0.004**	**0.023**	**0**	**0.008**	**0.085**	**0.1**	**0.18**	**0.23**	**0.089**	**0.081**
dichloroethylene;1,1-	91.42857143		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.4	<0.56	<0.4	<0.4	<0.4	<0.4
dichloropropane;1,2-	1.828571429	0.675675676	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.23	<0.32	<0.23	<0.23	<0.23	<0.23
dioxane;1,4-	13.71428571	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.36	<0.5	<0.36	<0.36	<0.36	<0.36
ethyl acetate	32		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<7.2	<10	<7.2	**8.9**	<7.2	<7.2
ethylbenzene	457.14		ND	**1.8**	**1.9**	ND	ND	**0.67**	**1.07**	ND	ND	ND	**2.3**	**1.4**	<0.43	<0.43	**2**	<0.43
ethylene dibromide (EDB)	4.114285714	0.004166667	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.077	<0.11	<0.077	<0.077	<0.077	<0.077
heptane;n-	182.8571429		ND	**0.3**	**0.7**	ND	ND	ND	ND	ND	ND	ND	**4.4**	<5.7	<4.1	<4.1	<4.1	<4.1
hexachlorobutadiene		0.113636364	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.21	<0.3	<0.21	<0.21	<0.21	<0.21
hexane;n-	320		ND	**4**	**4.1**	ND	ND	ND	ND	ND	ND	ND	**7.8**	**5.5**	<3.5	<3.5	4.8	<3.5
hexanone;2-	13.71428571		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<4.1	<5.7	<4.1	<4.1	<4.1	<4.1
methyl ethyl ketone (2-butanone)	2285.714286		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.9	<4.1	<2.9	<2.9	<2.9	<2.9
methyl methacrylate	320		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<4.1	<5.7	<4.1	<4.1	<4.1	<4.1
methyl tert-butyl ether (MTBE)	1371.428571	9.615384615	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<1.8	<2.5	<1.8	<1.8	<1.8	<1.8
methylene chloride	274.2857143	65.78947368	**-3**	**0**	**0**	ND	ND	**57 CE**	**0**	**25 CE**	5 CE	**5 CE**	<35	<49	<35	<35	46 lc	<35
naphthalene	1.371428571	0.073529412	**0.022**	**0.481**	**0.461**	**0.18**	**0.28**	**0.083**	**0.273**	**0.203**	**0.153**	**0.073**	**0.51**	**0.23**	**0.24**	**0.62**	**0.23**	**0.089 j**
propylbenzene;n-	457.1428571		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.5	<3.4	<2.5	<2.5	<2.5	<2.5
styrene	457.1428571		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.85	<1.2	<0.85	<0.85	<0.85	<0.85
tetrachloroethane;1,1,2,2-		0.043103448	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.14	<0.19	<0.14	<0.14	<0.14	<0.14
TETRACHLOROETHYLENE (PCE)	0.914285714	0.33393821	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<6.8	<9.5	<6.8	<6.8	<6.8	<6.8
tetrahydrofuran	914.2857143		ND	ND	ND	ND	ND	**0.59**	**0.65**	ND	ND	ND	<0.29	<0.41	<0.29	<0.29	<0.29	<0.29
toluene	2285.714286		ND	**10**	**9**	ND	ND	ND	ND	ND	ND	ND	**23**	<26	<19	<19	**19**	<19
trichlorobenzene;1,2,4-	0.914285714		ND	**3.2**	**3.2**	ND	ND	ND	ND	ND	ND	ND	<0.74	<1	<0.74	<0.74	<0.74	<0.74

Table 3. McCollum Park and Emander Landfill: Vapor Intrusion Indoor Air Cleanup Level Comparison

Analyte	Indoor Air Cleanup Level Method B Noncancer (µg/m³)	Indoor Air Cleanup Level Method B Cancer (µg/m³)	Indoor Air: BMX-1-IA[1] (corrected) (µg/m³)	POOL-1-IA[1] (corrected) (µg/m³)	POOL-2-IA[1] (corrected) (µg/m³)	WSU-EX1-IA[1] (corrected) (µg/m³)	WSU-EX2-IA[1] (corrected) (µg/m³)	WSU-ED1-IA[1] (corrected) (µg/m³)	WSU-ED2-IA[1] (corrected) (µg/m³)	STREAM-1-IA[1] (corrected) (µg/m³)	STREAM-2-IA[1] (corrected) (µg/m³)	STREAM-3-IA[1] (corrected) (µg/m³)	30921-Pool1[2] (µg/m³)	30921-Pool2[2] (µg/m³)	30921-WSU1[2] (µg/m³)	30921-WSU2[2] (µg/m³)	30921-Ed1[2] (µg/m³)	30921-Ed2[2] (µg/m³)
trichloroethane;1,1,1-	2285.714286		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.55	<0.76	<0.55	<0.55	<0.55	<0.55
trichloroethane;1,1,2-	0.091428571	0.15625	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.055	<0.076	<0.055	<0.055	<0.055	<0.055
TRICHLOROETHYLENE (TCE)	0.914285714	0.33393821	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.11	<0.15	<0.11	<0.11	<0.11	<0.11
trichlorofluoromethane	320		**4.3**	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.2	<3.1	<2.2	<2.2	<2.2	<2.2
trimethylbenzene;1,2,4-	27.42857143		ND	**3.2**	**3.2**	ND	ND	ND	ND	ND	ND	ND	**5.7**	**5.1**	<2.5	<2.5	<2.5	<2.5
trimethylbenzene;1,3,5-	27.42857143		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.5	<3.4	<2.5	<2.5	<2.5	<2.5
vinyl acetate	91.42857143		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<7	<9.9	<7	<7	<7	<7
vinyl chloride	45.71428571	0.284090909	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.26	<0.36	<0.26	<0.26	<0.26	<0.26
xylenes	45.71428571		ND	**10.7**	**11.3**	ND	ND	**4.43**	**6.83**	**0.83**	ND	ND	**12.5**	**7.7**	**1.1**	**1.76**	**10.5**	**1.2**
Total Petroleum Hydrocarbons	45.71428571		**20**	**329**	**298**	**35**	45	**91**	**212**	**90**	0	**43**	NT	NT	NT	NT	NT	NT

Bold indicates analyte detected

Bold & Shaded indicates value reported above MTCA Method B screening level

ND Not Detected after sample calibrated for Ambient Air Concentrations

CE Reported outside of calibration limitations and value is an estimate

Ic Reported value is due to laboratory contamination

j Reported value is an estimate

NT Not Tested

1 Sample collected by Aspect Consulting LLC, April 2021

2 Sample collected by EMB Consulting LLC, March 2021

Notes: Table includes only VOC chemicals reported in Ecology Cleanup Levels and Risk Calculations for air/vapor intrusion toxics

Appendix A

Parametrix - Technical Memorandum: McCollum Park & Emander Landfill Vapor Intrusion Screening

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

719 2ND AVENUE, SUITE 200 | SEATTLE, WA 98104 | P 206.394.3700

TECHNICAL MEMORANDUM

DATE:	August 5, 2021
TO:	Dave Schonhard
FROM:	Ian Sutton, PE; Michael Brady, LG, LHG
SUBJECT:	Vapor Intrusion Screening
PROJECT NUMBER:	373-1513-112
PROJECT NAME:	McCollum Park & Emander Landfill

Parametrix was retained by Snohomish County Department of Public Works Solid Waste Division (County) to investigate potential vapor intrusion (VI) at the former Emander Landfill located at 600 128th Street SE in Everett, Washington (Figure 1). This technical memorandum summarizes the results of the VI screening related to groundwater to vapor pathways and landfill gas (LFG) to vapor pathways. The screening was accomplished by reviewing recent groundwater quality data, and collecting samples of vapor from gas probes and monitoring wells and comparing the results to the Washington State Department of Ecology's (Ecology) cleanup levels and risk calculations (CLARC) VI screening levels for deep soil gas and groundwater to vapor pathways. The primary contaminants of concern for both pathways are the presence of volatile organic compounds (VOCs) which can produce air quality hazards.

BACKGROUND

The Emander Landfill has been redeveloped as McCollum Park. McCollum Park includes a park and ride lot, a bus station, athletic fields, a dirt bike track, pathways, nature trails, a playground, a community pool, the Snohomish County Washington State University (WSU) Extension Center, and the Adopt-a-Stream Northwest Stream Center (Figure 2).

The property was originally obtained by the County in 1922, and gravel mining began in 1929. The site was later used as a municipal solid waste landfill from 1947 to 1967 (AGI, 1996). LFG investigations and mitigation measures were started in the 1970's and 1980's and a Remedial Investigation (RI) and a Feasibility Study (FS) were completed in 1996 during redevelopment to include a park and ride facility. Prior protectiveness statements for the landfill have referenced the active LFG control systems to mitigate potential air quality hazards related to the former landfill.

Physical Setting

The site is located in Section 30 of Township 28 North, Range 5 East at an elevation of approximately 390 to 370 feet above sea level. Soil, groundwater, and LFG studies of the landfill have attempted to delineate the nature and extent of contamination as well as defining the physical setting of the property. Minard (1985) maps the surface geology of the site as Quaternary Vashon Advance Outwash (Qva) deposits. Qva deposits are primarily comprised of coarse-grained sand and gravel deposits. Investigations completed during the RI and FS showed the sand and gravel portion of the Qva deposits ranging from 13 to 65 feet thick. The Esperance Sand member of the Qva deposits was found underlying the sand and gravel. The Esperance Sand member is comprised of predominantly sand with few gravel lenses and silt interbeds. Investigations of the property show the Esperance Sand member being 47 to 89 feet thick. Underlying the Qva deposits is a lower confining layer consisting of clay. Minard (1985) maps the clay at Quaternary transitional beds (Qtb), these are described in the RI and FS as the Lawton Clay. The Lawton Clay thickness was not fully penetrated by investigations; however, Minard (1985)

indicates the clay extends down to an elevation approximately 160 feet above sea level on the upland margins, or approximately 220 feet below ground surface at the landfill.

Groundwater is present within the Qva deposits serving as the outwash aquifer. Previous reports for the landfill describe two zones of the outwash aquifer (upper and lower) having slightly different flow directions. The predominant groundwater flow path at the site is to the south following the flow of North Creek, and is predominantly southwest in the upper portion of the outwash aquifer and south-southwest in the lower portion of the outwash aquifer (Snohomish County, 2018). The outwash aquifer is unconfined and at relatively shallow depths ranging from 2 to 24 feet below the site (AGI, 1996).

Landfill Gas Systems

LFG is managed at the property by a series of vertical and horizontal collection points. Attachment A displays the LFG management system layout. A total vacuum is applied to the system which collects LFG across the property. The LFG is collected into a main underground manifold near the bus station which routes LFG to the flare facility. The flare is manually lit by County staff periodically until a flame is no longer supported by the methane. At that point, the vacuum system vents the LFG to the atmosphere.

The effectiveness of the LFG management system is periodically monitored at five gas probes across the property to confirm LFG capture and no presence of methane. Monitoring is completed at gas probes GP-14, GP-15, GP-16, GP-18, and GP-19.

Figure 2 displays the location of the flare facility and active gas probes.

Groundwater Monitoring

Groundwater monitoring has historically been completed quarterly at approximately 13 wells. Upper aquifer completed wells BH-03, BH-05, BH-06, BH-07, and BH-08, intermediate zone well MW-17, and lower aquifer completed wells MW-12, MW-14, MW-15, MW-16, MW-18, MW-19, and MW-20 are sampled. Quarterly monitoring data from these wells for VOCs, metals, polychlorinated biphenyls (PCBs), carcinogenic polycyclic aromatic hydrocarbons (cPAHs) are available from Ecology's Cleanup site ID document repository for years 2013 through March 2020 (Ecology, 2020). Figure 2 displays the location of the active monitoring wells.

Recent Studies

The Snohomish County Parks and Recreation Department recently completed indoor air sampling of three on-site buildings (pool building, WSU Extension Office, and WSU Education Building) for VOCs. The indoor air study revealed the presence of several VOCs above Model Toxics Control Act (MTCA) Method B cancer indoor air cleanup levels at on-site buildings including 1,2-dichloroethane, 1,3-butadiene, 1,4-dichlorobenzene, benzene, carbon tetrachloride, chloroform, and naphthalene (EMB Consulting, 2021). The report raised the possibility that LFG from the former Emander Landfill could be the source of the VOCs present in indoor air.

PROJECT SCOPE

The Phase 1 objectives as listed below were to perform a preliminary assessment at the site in accordance with Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2018): Investigation and Remedial Action (Publication No. 09-09-047 Rev 2018) to determine if volatile organics from the landfill are potentially adversely affecting properties near the landfill footprint.

1. Review available background documents to evaluate historical and current conditions in LFG and groundwater. Determine contaminant source concentrations, potential contaminant migration pathways, and locations and condition of existing wells and probes available for sampling.

2. Purge and collect gas samples from the five existing LFG probes surrounding the landfill and submit for laboratory analysis (TO-15). Measure methane concentrations in each probe with a handheld meter. Measure the depth to groundwater in probes, if present.
3. Summarize gas probe (deep soil gas) and groundwater concentrations and compare to MTCA Method B cancer/noncancer VI screening levels to assess whether existing conditions have the potential to contaminate indoor air in the occupied buildings.
4. Evaluate whether the available data and sampling locations are sufficient to determine the nature and extent of the VOC contamination from the landfill in groundwater and the vadose zone, and to allow evaluation of the potential impacts to the occupied buildings present near the Emander Landfill.
5. Prepare a report summarizing findings and presenting recommendations for further evaluations, if necessary. Recommendations could include additional soil, groundwater, and vapor testing; and/or performing indoor air modeling using the Johnson and Ettinger model, if VOC concentrations exceed MTCA screening levels.

PRELIMINARY FIELD INVESTIGATION

On April 26, 2021, Parametrix performed a preliminary field investigation to verify the location of gas probes, monitoring wells, LFG management systems, LFG sample ports, and the flare facility at the site. A County representative guided Parametrix across the property. Water levels were measured in gas probes GP-14, GP-15, GP-16, GP-18, and GP-19 and monitoring wells BH-03 and BH-07 to verify the screens were not blocked with water and well/probe dimensions were verified. Table 1 summarizes the water level and well/probe dimensions from the preliminary investigation. As noted in the table, gas probe GP-16 screened section was completely blocked with water. Similarly, BH-03 was also completely blocked with water and BH-07 was partially blocked having approximately 0.84 feet of screen exposed to the vadose zone.

Parametrix reviewed the layout of the existing LFG extraction system noting that several manifolds contain sample ports should sampling be necessary in the future. The main manifold for the LFG collection system is located near the current bus facility in a vented in-ground manhole. Three main lines merge at the manifold to one exit line to the flare facility. The three main lines and exit line all have sampling ports to allow collection of samples.

The flare facility was observed and noted to be venting to atmosphere without the use of a flare. Strong LFG odors were observed up to 100 feet away downwind to the south of the flare facility in an area accessible by the public. The no smoking sign on the flare facility was not legible and there were no other notifications warning park users of hazards. The flare facility itself is in a fenced area. There is damage to the fence on the southeast side where vandals previously broke in and removed the solar powered vent flare. A sample port was observed on the main LFG collection piping prior to entering the condensate drum and the vacuum blower. The condensate drum was observed to be in poor condition with severe rust formation on the top and sides of the steel drum.

Based on the site observations, a plan was formulated to sample for VOCs and measure LFG concentrations at monitoring well BH-07, gas probes GP-14, GP-15, GP-18, and GP-19, and at the flare.

SAMPLING INVESTIGATION

On April 28, 2021, Parametrix along with a County representative measured LFG concentrations of methane, carbon dioxide, oxygen, carbon monoxide, and hydrogen sulfide with a Landtec GEM 5000 (GEM) at the six locations (monitoring well BH-07, gas probes GP-14, GP-15, GP-18, and GP-19, and at the flare). Three well volumes were purged using the GEM prior to recording the measurements after accounting for the water level in the probes/well. Table 2 displays the results of the LFG concentrations measured with the GEM. Photographs of the sampling locations are included as Attachment B.

No methane was observed in the four gas probes and one monitoring well. Methane was found at 15.4 to 15.9 percent methane by volume at the sample port at the flare facility which is consistent with expected concentrations at this location in the LFG extraction system.

Following collection of measurements with the GEM, Parametrix attached a new laboratory supplied Teflon tubing and silicon manifold to the locations to allow for collection of gas using a 1-liter Summa canister. A helium shroud was utilized to ensure no ambient air could enter the sampling canister. The shroud was filled with 20 percent helium and a helium detector was placed in the purge port of the manifold to confirm no leaks. Similarly, a seal check was performed on the manifold to confirm no leakage. The shroud and seal checks were completed on GP-14, GP-15, and GP-18. GP-19 was directly connected to the gas probe as the seal check on the manifold repeatedly failed. Monitoring well BH-07 and the flare were directly connected to the sampling canister using a rubber stopper and Teflon tubing.

The starting pressures ranged from -29 to -31 inches of Mercury. Each of the canisters were closed when they reached -4.75 inches of Mercury. The total purge time per canister was five minutes for each sample. The location identification, canister identification, regulator identification, initial and final vacuums, and initial and final sampling times were reported on the chain of custody and field sampling forms. The samples were submitted to Friedman and Bruya, Inc. on the same day of sample collection for analysis of VOCs using EPA compendium Method TO-15.

VAPOR INTRUSION SCREENING RESULTS

Groundwater results reported in Ecology's Environmental Information Management database for 2013 through March 2020 were reviewed to compare with air toxics for the MTCA Method B cancer and non-cancer screening levels for the groundwater to vapor pathway. The laboratory results (Attachment C) for the air samples were similarly compared to the MTCA method B cancer and non-cancer screening levels for the deep soil gas to vapor pathway for wells and probes and cleanup levels for ambient air for the flare discharge sample. Table 3 summarizes the results of the VI screening for chemicals on the Method TO-15 list and compares them with MTCA Method B screening levels. Fifty VOCs included in the standard TO-15 analysis were evaluated for the vapor intrusion/air quality screening. This did not include a complete list of all air toxics listed in CLARC.

Groundwater to Vapor Pathway

Table 3 summarizes the groundwater results and compares them with MTCA B groundwater screening levels for vapor intrusion. For the groundwater to vapor pathway, two VOCs, benzene and vinyl chloride, were found above the MTCA Method B cancer screening levels. Ethylene dibromide was reported at 0.30 µg/L which is the MTCA Method B cleanup level. 33 other air toxics were found either non-detect or below MTCA Method B cancer and non-cancer screening levels. Fifteen air toxics including acrolein, benzyl chloride, 1,3 butadiene, cumene, cyclohexane, 1,4-dioxane, ethyl acetate, n-heptane, n-hexane, methyl tertiary butyl ether, methyl methacrylate, n-propylbenzene, tetrahydrofuran, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene were not tested in groundwater.

Benzene was found above the screening level of 2.4 µg/L at BH-07 up to 4.0 µg/L. The data show benzene above the screening level at BH-07 from December 2013 through September 2014. Since that time, benzene has remained below the screening level and has been non-detect (<1 µg/L) from September 2015 through the present. Benzene was not detected at any other monitoring well locations. Based on the recent data, it does not appear the groundwater to vapor pathway for benzene is complete.

Ethylene dibromide (EDB) was reported at the MTCA Method B cancer screening level at 0.30 µg/L at MW-10 in 2013. This results was J-flagged by the laboratory indicating it is an estimate. EDB has been non-detect in all wells at the site since 2013 and less than 0.01 µg/L for the 2019 and 2020 data. Based on the data, it does not appear the groundwater to vapor pathway for EDB is complete.

Vinyl chloride was found above the screening level of 0.34 µg/L at BH-03A, BH-05, BH-06, BH-07, MW-14, MW-16, MW-18, MW-19, and MW-20. The highest concentration recorded at the site from 2013 to 2020 was at MW-18 in March 2014 at 87.8 µg/L. These high concentrations at MW-18 appear to be related to a slug source due to high groundwater or new saturation that occurred near that time period.

For recent data only (2019 and 2020), vinyl chloride was found above the screening level at BH-03, BH-05, BH-07, MW-16, and MW-18. These locations are located on the downgradient portion of the property where vinyl chloride is most likely to be present as the daughter product of reductive dechlorination. BH-07 and MW-18 are located outside the footprint of the LFG collection system and are immediately adjacent to the WSU Education Facility and upgradient of the WSU Extension Building and Adopt-A-Stream Building. These two wells have the highest concentrations of vinyl chloride at the site, and the most recent data available from March 2020 was 5.00 µg/L at MW-18 and 1.05 µg/L at BH-07. The data indicates vinyl chloride likely currently exceeds the MTCA Method B cancer screening level for the groundwater to vapor pathway near the on-site buildings. However, vinyl chloride was not detected in indoor air (EMB 2021).

Landfill Gas to Vapor Pathway

Table 3 summarizes the LFG results and compares them with MTCA B deep soil gas screening levels for vapor intrusion. For the LFG to vapor pathway, one VOC, acrolein, was found above the MTCA Method B non-cancer screening level. 49 other VOCs were found below the MTCA Method B cancer and non-cancer screening levels.

Acrolein was found above the non-cancer screening level of 0.91 ug/m^3 at GP-18, GP-19, and BH-07, and detected below the screening level at GP-14 and GP-15. This does not appear to be related to the property. Acrolein is a problematic compound known to be a false positive related to contamination issues from the wall of the actual Summa cannisters. EPA and others (2015) indicate acrolein can remain in canisters even through the cleaning process and can actually grow in concentrations over time between the time of sampling and time of analysis. Parametrix contacted Friedman and Bruya, Inc. based on the results. The laboratory noted that many other client's samples were also showing detections of acrolein above the screening level. This indicates the acrolein identified above the screening levels are not verified and likely false positives not related to LFG at the property.

Landfill Gas Analysis

Table 3 summarizes the LFG results for the sample collected at the flare and compares them to MTCA Method B cancer and non-cancer cleanup levels for ambient air (Table 3). The LFG discharging at the flare was found above the MTCA Method B cleanup levels for eight VOCs including benzene, chlorobenzene, 1,4-dichlorobenzene, n-hexane, n-heptane, 1,2,4-trimethylbenzene, vinyl chloride, and total xylenes. 43 other VOCs were found below the MTCA Method B cleanup levels or not detected in the sample. Several detection limits reported in the sample results are above the MTCA Method B cleanup levels; therefore, there may be exceedances not identified by the results due to the dilution requirements of the sample.

CONCURRENT STUDIES

In the same period of the Parametrix investigation, Aspect Consulting (Aspect) performed a Tier 2 vapor intrusion study of the buildings for the Parks and Recreation Department. This involved sampling sub-slab soil gas as well as indoor air at the Pool building, BMX building, WSU Education Building, the WSU Extension Building, and the Adopt-A-Stream Building. The draft report (Aspect, 2021) concluded that the indoor air cleanup level exceedances of on-site buildings did not correspond with the sub-slab soil gas concentrations and that the source of the indoor air contamination identified in the EMB Consulting study is not likely due to VI from the former landfill. The Tier 2 VI study results completed for the Parks and Recreation Department are consistent with the results of this study. Further, the results obtained by Aspect show no concentrations of vinyl chloride in sub-slab soil gas or in indoor

air. Additionally, acrolein was found in all the samples, and analysis was performed by Friedman and Bruya, Inc. supporting acrolein as a common false positive resulting from the Summa canisters.

CONCLUSIONS

Based on the results of the investigation, Parametrix has reached the following conclusions:

- The groundwater to vapor pathway was evaluated showing only two contaminants, benzene and vinyl chloride, exceeding screening levels between 2013 and 2020. One contaminant, EDB, was estimated to be detected at the screening level of 0.3 µg/L in 2013.
- Only vinyl chloride is currently exceeding screening levels for the groundwater to vapor pathway based on the 2019-2020 results. Sub-slab soil gas and indoor air were sampled separately by Aspect and indoor air sampled recently by EMB Consulting and found no detections of vinyl chloride in samples. This suggests although the groundwater to vapor pathway was found to exceed screening levels, the pathway does not appear to be complete.
- The LFG to vapor pathway was evaluated showing only one contaminant, acrolein, exceeding screening levels for deep soil gas. The acrolein results are not verified and are likely false positives related to the Summa cannisters and not related to the landfill.
- The LFG management system is removing LFG and VOCs from the subsurface and no exceedances of methane or VOCs were identified within the gas probes or one monitoring well sampled. The LFG management system remains the primary engineering control to mitigate the potential for VI for on-site and off-site buildings.
- The LFG management system does not generate enough methane to support a continuous flame and was observed at 15.4 to 15.9 percent methane by volume. Seven VOCs including benzene, chlorobenzene, 1,4-dichlorobenzene, n-hexane, 1,2,4-trimethylbenzene, vinyl chloride, and total xylenes were found above ambient air cleanup levels. Under an active flame, these VOCs would be combusted by the flare.

CONSIDERATIONS BASED ON THE RESULTS AND OBSERVATIONS

- Gas probe GP-16 was observed blocked with water. This appears to be the result of a continuous relatively high water table at that location. A replacement gas probe with a shallow screen outside of the landfill cap footprint may be appropriate. A replacement probe location may be preferable near existing wells BH-07 and MW-18 to better capture the pathway towards the WSU buildings.
- The flare facility no longer supports a continuous flame. It may be appropriate to explore options to allow safe combustion or encapsulation of the VOCs as the area surrounding the flare facility is accessible to the public. It may also be appropriate to include sampling ambient air downwind of the flare facility for LFG to confirm methane is dissipating and does not present an explosion risk.

ATTACHMENTS

Figure 1 – Site Location Map

Figure 2 – Site Detail Map

Table 1 – Field Observations at Sampling Locations, McCollum Park, April 26, 2021.

Table 2 – Landfill Gas and VOC Sample Details, McCollum Park, April 28, 2021.

Table 3- Vapor Intrusion Screening Results, McCollum Park.

Attachment A – Landfill Gas Control System Layout

Attachment B – Site Photographs

Attachment C – Laboratory Analytical Results

REFERENCES

AGI Technologies. 1996. Final Cleanup Action Plan, McCollum Park/Emander Landfill, Snohomish County, Washington. Prepared for Washington Department of Ecology. April.

Aspect Consulting. 2021, Draft Tier II Assessment Report, McCollum Park Site, prepared for Snohomish County. June 4.

Ecology (Washington State Department of Ecology). 2013. Model Toxics Control Act Regulation and Statute, Ecology publication no 94-06, available online at https://apps.ecology.wa.gov/publications/SummaryPages/9406.html

Ecology, 2018, Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Ecology publication no 09-09-047, available online at https://apps.ecology.wa.gov/publications/SummaryPages/0909047.html

Ecology. 2020. Document Repository for McCollum Park, Cleanup site ID 3992, available online at https://apps.ecology.wa.gov/gsp/CleanupSiteDocuments.aspx?csid=3992

Ecology. 2021. Cleanup Levels and Risk Calculations, available online at https://www.ezview.wa.gov/Portals/_1987/Documents/Documents/CLARC_Master.xlsx

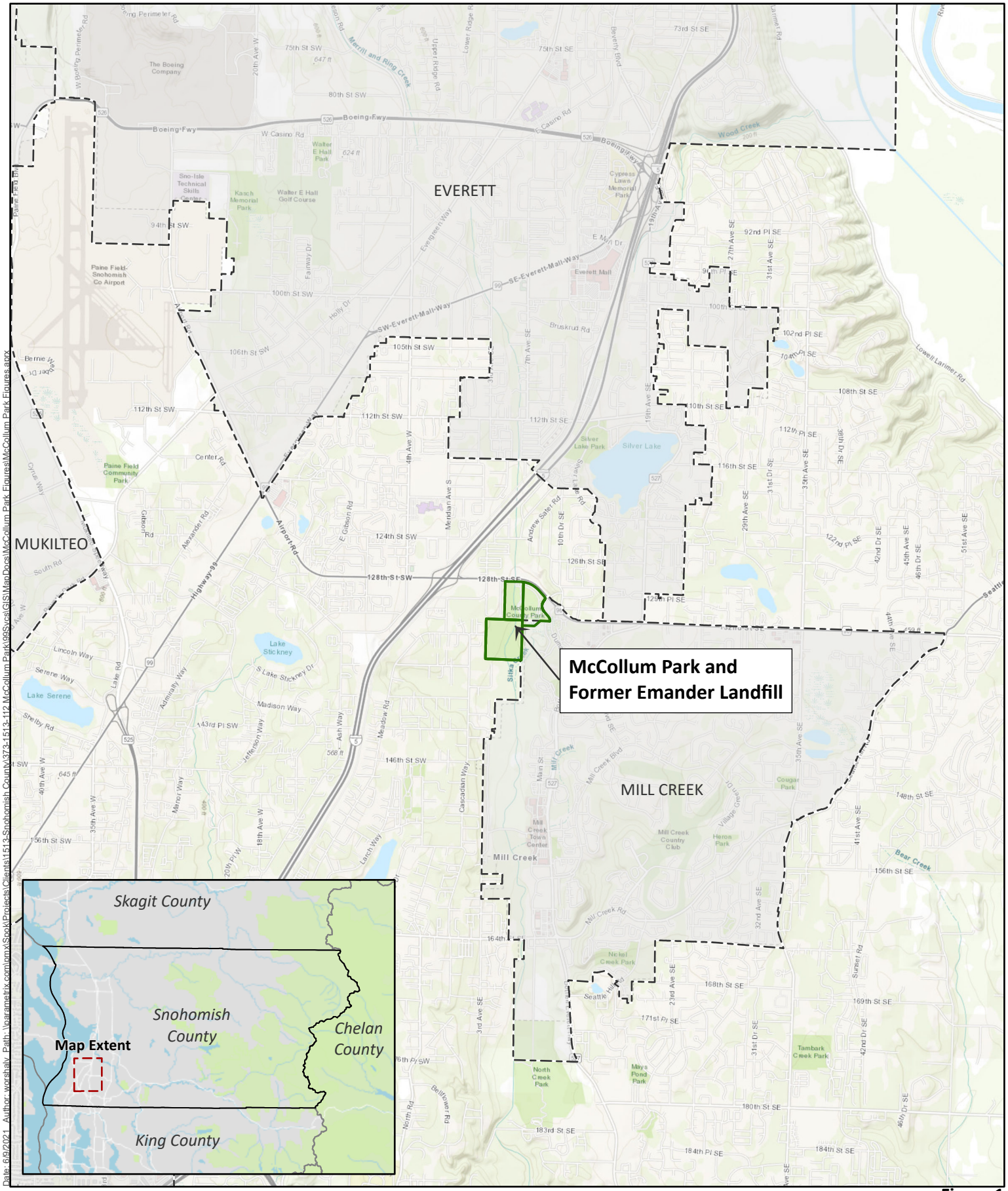
EMB Consulting, LLC. 2021. Preliminary Vapor Intrusion Assessment, McCollum Pioneer Park, prepared for Snohomish County. April 1.

EPA (U.S. Environmental Protection Agency) and others. 2015. Improving the analysis of acrolein in ambient air, presentation at the National Air Toxics Monitoring and Data Analysis Workshop October 2015; available online at https://www.epa.gov/sites/production/files/2021-03/documents/improving_the_analysis_of_acrolein_in_ambient_air.pdf

Minard, J.P. 1985. The Geologic Map of the Everett 7.5-minute Quadrangle, US Geological Survey Miscellaneous Field Studies Map 1748, available online at https://pubs.er.usgs.gov/publication/mf1748

Snohomish County Public Works (Snohomish County, 2018, McCollum Park (Former Emander Landfill) – Request for Agreed Order Completion and Reduction of Groundwater Monitoring Frequency, as submitted to Ching-Pi Wang of the Washington State Department of Ecology

Figures



Date: 6/9/2021 Author: worshalv Path: \\parametrix.com\pmx\Spok\Projects\Clients\1513-Snohomish County\373-1513-112 McCollum Park\99Svcs\GIS\MapDocs\McCollum Park Figures\McCollum Park Figures.aprx

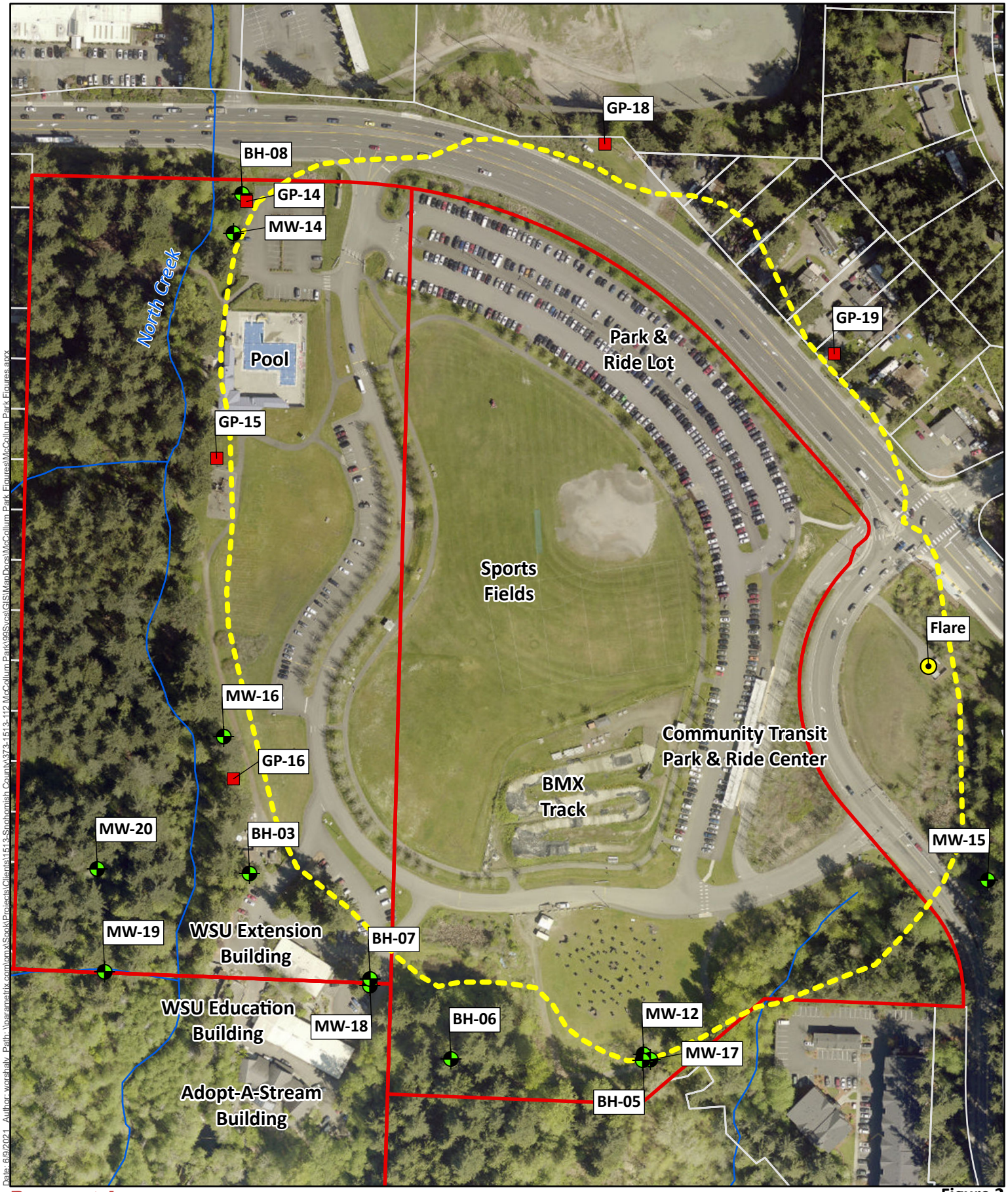
Parametrix

McCollum Park Parcel
City Boundary

0 0.25 0.5 1 Miles

Figure 1
Site Location Map
McCollum Park and Emander Landfill

Snohomish County, WA



Parametrix

Flare
Gas Probe
Monitoring Well
Stream
Emander Landfill Extent (approx,)
McCollum Park Parcel
Parcel Boundary

0 50 100 200 Feet

Figure 2
Site Detail Map
McCollum Park and Emander Landfill

Snohomish County, WA

Tables

Table 1. Preliminary Field Investigation Results, McCollum Park, April 26, 2021

Location ID	Type	Screen Top (ft bgs)	Measuring Point	Stick Up / Stick Down (ft)	Screen Top (ft btoc)	Depth to Water (ft btoc)	Time	Unsaturated Screen (ft)	Well Diameter	Notes
BH-03	Well	12	TOC	1.73	13.73	5.58	10:02	-8.15	2-inch	Blocked with water
BH-07	Well	4	TOC	0.99	4.99	5.83	9:55	0.84	2-inch	
GP-14	Gas Probe	5	TOC	-0.46	4.54	NM	11:30	NM	1/2-inch	Could not remove gas probe valve to measure water
GP-15	Gas Probe	5	TOC	-1.06	3.94	8.54	10:47	4.60	1/2-inch	
GP-16	Gas Probe	5	TOC	-0.72	4.28	3.00	10:10	-1.28	1/2-inch	Blocked with water
GP-18	Gas Probe	5	TOC	-0.56	4.44	16.76	10:30	12.32	1/2-inch	
GP-19	Gas Probe	5	TOC	-0.23	4.77	11.92	10:22	7.15	1/2-inch	

Notes: TOC = top of casing
ft = feet
btoc = below top of casing
NM = Not Measured

Table 2. Landfill Gas and VOC Sample Details, McCollum Park, April 28, 2021

Landfill Gas Measurements										
Location ID	Type	Time	Purge Time (min)	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Carbon Monoxide (%by vol)	Hydrogen Sulfide (%by vol)	Well Diameter	Notes
BH-07	Well	12:18:00 PM	6.67	0.0	0.1	21.0	0.0	1.0	2-inch	
GP-14	Gas Probe	9:28:00 AM	3.00	0.0	3.8	17.4	0.0	0.0	1/2-inch	County measured LFG after 30 sec purge/stabilize
GP-15	Gas Probe	10:18:00 AM	1.35	0.0	6.0	15.2	0.0	0.0	1/2-inch	County measured LFG after 30 sec purge/stabilize
GP-18	Gas Probe	11:40:00 AM	1.73	0.0	2.2	19.0	1.0	1.0	1/2-inch	County measured LFG after 30 sec purge/stabilize
GP-19	Gas Probe	11:16:00 AM	1.70	0.0	5.6	13.9	0.0	1.0	1/2-inch	County measured LFG after 30 sec purge/stabilize
Flare	LFG Control	12:51:00 PM	0.00	15.9	14.8	3.1	2.0	1.0	N/A	County measured LFG after 30 sec stabilize
		12:54:00 PM	0.00	15.4	14.7	3.3	2.0	1.0		

VOC Sample Details									
Location ID	Type	Canister ID	Regulator ID	Initial Pressure (In Hg)	Initial Time	Final Pressure (in Hg)	Final Time	Connection Type	Notes
BH-07	Well	3385	106	-30.00	12:36:00 PM	-4.75	12:41:00 PM	Direct connect	Connected to pump manifold with rubber stopper
GP-14	Gas Probe	3347	35	-29.00	9:57:00 AM	-4.75	10:02:00 AM	Manifold	Helium shroud, seal check pass
GP-15	Gas Probe	3386	101	-29.00	10:41:00 AM	-4.75	10:46:00 AM	Manifold	Helium shroud, seal check pass
GP-18	Gas Probe	3671	07	-29.00	11:54:00 AM	-4.75	11:59:00 AM	Manifold	Helium shroud, seal check pass
GP-19	Gas Probe	3674	117	-31.00	11:30:00 AM	-4.75	11:35:00 AM	Direct connect	Seal check failed, directly connected to probe
Flare	LFG Control	3483	105	-31	12:59:00 PM	-4.75	1:04:00 PM	Direct Connect	Connected to steel piping with rubber stopper

Table 3. Vapor Intrusion Screening Results, McCollum Park

Chemical	Groundwater to Vapor Pathway				Landfill Gas to Vapor Pathway							Flare/Ambient Air			Notes
	Groundwater Screening Level Method B Noncancer (µg/L)	Groundwater Screening Level Method B Cancer (µg/L)	Highest Concentration at Landfill (2013-2021) (µg/L)	Highest Concentration at Landfill Recent Data Only (2019 - 2020)	Deep Soil Gas Screening Level Method B Noncancer (µg/m³)	Deep Soil Gas Screening Level Method B Cancer (µg/m³)	GP-14 (µg/m³)	GP-15 (µg/m³)	GP-19 (µg/m³)	GP-18 (µg/m³)	BH-07 (µg/m³)	Air Method B Noncancer Cleanup Level (µg/m³)	Air Method B Cancer Cleanup Level (µg/m³)	Flare (µg/m³)	
acetone	15,000,000.00		**12.10**	N/A	1,400,000.00		**44**	**49**	**37**	<28	<27	14,000.00		<470	
acrolein	2.90		NT	N/A	0.91		**0.73**	**0.89**	**1.1**	**1.2**	**2.5**	0.01		<11	Unverified, likely false positives due to canisters, EPA/Whitaker et. al. 2015, EPA, 2010
benzene	100.00	2.40	**4.00**	<1.0	1,400.00	32.00	<1.8	<1.9	<1.9	<1.9	<1.8	14.00	0.32	**160**	Above screening level in groundwater and above cleanup level for air
benzyl chloride	56.00	6.20	NT	N/A	46.00	5.10	<0.28	<0.31	<0.30	<0.31	<0.30	0.46	0.05	<5.1	
bromodichloromethane		1.80	<3.9	N/A		6.80	<0.37	<0.40	<0.39	<0.40	<0.38		0.07	<6.6	
bromoform		220.00	<1.0	N/A		230.00	<11	<12	<12	<12	<12		2.30	<200	
bromomethane	13.00		<1.0	N/A	230.00		<13	<14	<14	<14	<13	2.30		<230	
butadiene;1,3-	0.42	0.04	NT	N/A	91.00	8.30	<0.24	<0.27	<0.26	<0.26	<0.25	0.91	0.08	<4.3	
carbon disulfide	400.00		<1.0	N/A	32,000.00		<34	<37	<36	<37	<36	320.00		<610	
carbon tetrachloride	61.00	0.56	<3.9	N/A	4,600.00	42.00	<1.7	<1.9	<1.8	<1.9	<1.8	46.00	0.42	<31	
chlorobenzene	290.00		**3.36**	N/A	2,300.00		<2.5	<2.8	<2.7	<2.7	<2.6	23.00		**290**	Above cleanup level for air
chloroform	490.00	1.20	<1.0	N/A	4,500.00	11.00	**0.4**	**1.2**	**1.1**	**2.6**	<0.28	45.00	0.11	<4.8	
chloromethane	150.00		**12.20**	N/A	4,100.00		<20	<22	<22	<22	<21	41.00		<360	
cumene (isopropylbenzene)	910.00		NT	N/A	18,000.00		<14	<15	<14	<15	<14	180.00		<240	
cyclohexane	750.00		NT	N/A	270,000.00		<38	<41	<40	<41	<39	2,700.00		**800**	
dichlorobenzene;1,2-	2,500.00		<2.1	N/A	9,100.00		<3.3	<3.6	<3.5	<3.5	<3.4	91.00		<59	
dichlorobenzene;1,4-	7,900.00	4.90	<2.1	N/A	37,000.00	23.00	<1.3	<1.4	<1.4	<1.4	<1.4	370.00	**0.23**	**210**	Above cleanup level for air
dichloroethane;1,1-		11.00	<1.0	N/A		160.00	<2.2	<2.4	<2.3	<2.4	<2.3		1.60	<40	
dichloroethane;1,2- (EDC)	140.00	4.20	<6.5	N/A	320.00	9.60	<0.22	<0.24	<0.23	<0.24	<0.23	3.20	0.10	<4.0	
dichloroethylene;1,1-	130.00		<1.0	N/A	9,100.00		<2.2	<2.4	<2.3	<2.3	<2.3	91.00		<39	
dichloropropane;1,2-	28.00	10.00	<7.8	N/A	180.00	68.00	<1.3	<1.4	<1.3	<1.4	<1.3	1.80	0.68	<23	
dioxane;1,4-	130,000.00	4,700.00	NT	N/A	1,400.00	50.00	<2.0	<2.2	<2.1	<2.1	<2.1	14.00	0.50	<35	
ethyl acetate	10,000.00		NT	N/A	3,200.00		<40	<43	<42	<43	<41	32.00		<710	
ethylbenzene	2,800.00		<1.0	N/A	46,000.00		**7.6**	**5.9**	**4.4**	**4.1**	**3**	460.00		**280**	
ethylene dibromide (EDB)	290.00	0.30	**0.30 J**	<0.01	410.00	0.42	<0.42	<0.46	<0.45	<0.45	<0.44	4.10	0.00	<7.5	
heptane;n-	4.00		NT	N/A	18,000.00		<23	<25	<24	<24	<23	180.00		**730**	Above cleanup level for air
hexachlorobutadiene		0.80	<2.1	N/A		11.00	<1.2	<1.3	<1.2	<1.3	<1.2		0.11	<21	
hexane;n-	7.20		NT	N/A	32,000.00		<19	<21	<20	<21	<20	320.00		**960**	Above cleanup level for air
hexanone;2-	7,300.00		<5.0	N/A	1,400.00		<23	<25	<24	<24	<23	14.00		<400	
methyl ethyl ketone (2-butanone)	1,700,000.00		<5.0	N/A	230,000.00		<16	<18	<17	<17	<17	2,300.00		<290	
methyl methacrylate	50,000.00		NT	N/A	32,000.00		<23	<25	<24	<24	<23	320.00		<400	
methyl tert-butyl ether (MTBE)	120,000.00	860.00	NT	N/A	140,000.00	960.00	<9.9	<11	<10	<11	<10	1,400.00	9.60	<180	
methylene chloride	4,800.00	1,200.00	**3.50**	N/A	27,000.00	6,600.00	<190	<210	<200	<200	<200	270.00	66.00	<3,400	
naphthalene	170.00	8.90	<2.0	N/A	140.00	7.40	<1.4	<1.6	<1.5	<1.5	<1.5	1.40	0.07	<26	
propylbenzene;n-	2,300.00		NT	N/A	46,000.00		<14	<15	<14	<15	<14	460.00		<240	
styrene	8,100.00		<1.0	N/A	46,000.00		<4.7	<5.1	<4.9	<5.0	<4.9	460.00		<83	
tetrachloroethane;1,1,2,2-		6.20	<1.0	N/A		4.30	<0.76	<0.82	<0.80	<0.81	<0.78		0.34	<13	

Table 3. Vapor Intrusion Screening Results, McCollum Park

Chemical	Groundwater to Vapor Pathway				Landfill Gas to Vapor Pathway							Flare/Ambient Air			Notes
	Groundwater Screening Level Method B Noncancer (µg/L)	Groundwater Screening Level Method B Cancer (µg/L)	Highest Concentration at Landfill (2013-2021) (µg/L)	Highest Concentration at Landfill Recent Data Only (2019 - 2020)	Deep Soil Gas Screening Level Method B Noncancer (µg/m³)	Deep Soil Gas Screening Level Method B Cancer (µg/m³)	GP-14 (µg/m³)	GP-15 (µg/m³)	GP-19 (µg/m³)	GP-18 (µg/m³)	BH-07 (µg/m³)	Air Method B Noncancer Cleanup Level (µg/m³)	Air Method B Cancer Cleanup Level (µg/m³)	Flare (µg/m³)	
TETRACHLOROETHYLENE (PCE)	46.00	24.00	<10.4	N/A	1,800.00	960.00	<37	<41	<39	<40	<39	18.00	9.60	<660	
tetrahydrofuran	520,000.00		NT	N/A	91,000.00		<1.7	**11**	<1.8	<1.8	<1.8	910.00		<30	
toluene	15,000.00		**2.30**	N/A	230,000.00		<100	<110	<110	<110	<110	2,300.00		<1,800	
trichlorobenzene;1,2,4-	38.00		<2.1	N/A	91.00		<4.1	<4.5	<4.3	<4.4	<4.2	0.91		<73	
trichloroethane;1,1,1-	5,400.00		<1.0	N/A	230,000.00		<3.0	<3.3	<3.2	<3.2	<3.1	2,300.00		<53	
trichloroethane;1,1,2-	4.60	7.90	<1.0	N/A	9.10	16.00	<0.30	<0.33	<0.32	<0.32	<0.31	0.09	0.16	<5.3	
TRICHLOROETHYLENE (TCE)	3.80	1.40	<1.0	N/A	91.00	33.00	<0.59	<0.64	<0.62	<0.63	<0.61	0.91	0.33	<11	
trichlorofluoromethane	120.00		<1.0	N/A	32,000.00		<12	<13	<13	<13	<13	320.00		<220	
trimethylbenzene;1,2,4-	240.00		NT	N/A	2,700.00		<14	<15	<14	<15	<14	27.00		**440**	Above cleanup level for air
trimethylbenzene;1,3,5-	170.00		NT	N/A	2,700.00		<14	<15	<14	<15	<14	27.00		<240	
vinyl acetate	7,800.00		<5.0	N/A	9,100.00		<39	<42	<41	<42	<40	91.00		<690	
vinyl chloride	55.00	0.34	**87.80**	**5.00**	4,600.00	28.00	<1.4	<1.5	<1.5	<1.5	<1.5	46.00	0.28	**110**	Above screening level in groundwater and above cleanup level for air
xylenes	320.00		**1.20**	N/A	4,600.00		**49**	**33.7**	**24.4**	**27**	**19.2**	46.00		**344**	Above cleanup level for air

Notes: **Bold** = Analyte Detected

Red = Found above MTCA Method B screening level or cleanup level

J = level reported is an estimate

N/A = Not Analyzed

NT = Not Tested

Attachment A

Landfill Gas Control System Layout

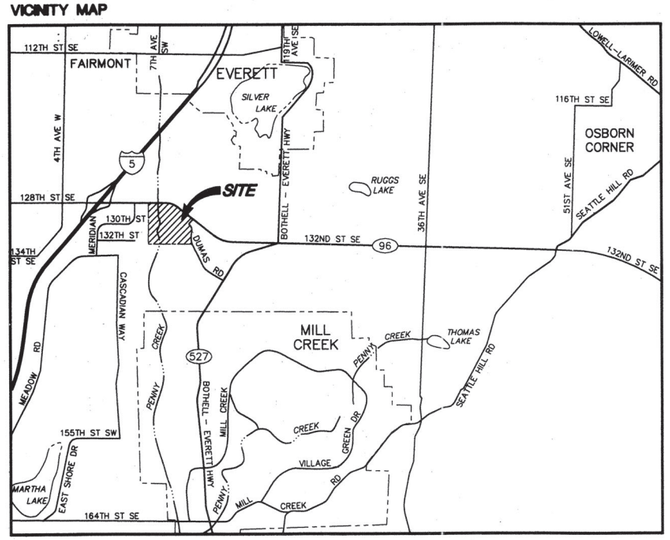
McCOLLUM PARK PROJECT
128th STREET SE AND DUMAS ROAD
SNOHOMISH COUNTY, WASHINGTON

LANDFILL GAS MANAGEMENT SYSTEM
CONSTRUCTION PLAN

INDEX OF DRAWINGS

ADDENDUM TO CONSTRUCTION PLANS:
REPLACE SHEETS 36, 37, 38a, & 38b WITH THE FOLLOWING.

VICINITY MAP



LEGEND

MW-16	EXISTING MONITORING WELL NUMBER AND LOCATION
LB15/PZ-3	EXISTING LANDFILL BORING/PIEZOMETER NUMBER AND LOCATION
GMP-23	PROPOSED GAS MANAGEMENT PERIMETER WELL: 4" DIA. HDPE CASING, 15' DEEP
GMV-3	PROPOSED GAS MANAGEMENT VENT WELL: 4" DIA. HDPE CASING, 15' DEEP
	PROPOSED 4' x 6' CONCRETE ACCESS VAULT (PERIMETER SYSTEM); NOTE SIZE EXAGGERATED FOR CLARITY ON SHEET C1
	PROPOSED 4' x 6' CONCRETE ACCESS VAULT (VENT SYSTEM); NOTE SIZE EXAGGERATED FOR CLARITY ON SHEET C1
	PROPOSED 4' x 4' CONCRETE ISOLATION VAULT
	PROPOSED 4" DIA. CONDENSATE SUMP RISER
----------	PROPOSED GAS MANAGEMENT TRENCH "TYPE I": 2" DIA. SLOTTED HDPE IN GRAVEL-FILLED TRENCH
==========	PROPOSED GAS MANAGEMENT TRENCH "TYPE II": 2" OR 4" DIA. SLOTTED HDPE IN GRAVEL-FILLED TRENCH
————	PROPOSED 2" OR 4" DIA. BLANK HDPE HEADER
—— ——	PROPOSED 6" DIA. BLANK HDPE HEADER
.....	EXISTING 2" OR 4" DIA. HDPE PIPE TO BE ABANDONED IN PLACE
========●=========	PROPOSED 10.5" DIA. HOLLOW STEM AUGER LOCATION; GRAVEL FILLED, 10' DEEP
—·—·—	PROPOSED ELECTRICAL CONDUIT
▲	LOCATION OF PROPOSED AMBIENT COMBUSTIBLE GAS SENSOR/ALARM
	AREA LUMINAIRE ON 12.2 METER CONCRETE POLE, SINGLE AND TANDEM
	CONCRETE HANDHOLE, LUMINAIRE POWER

JAMES S. DRAINSFIELD — STATE OF WASHINGTON — 23921 — REGISTERED PROFESSIONAL ENGINEER

4/27/95

EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\G1.DWG

PLAN CHECK	BY	DATE						
			DATE	NO.	REVISION		BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		1 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX

DATE APPROVED: | FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4569 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

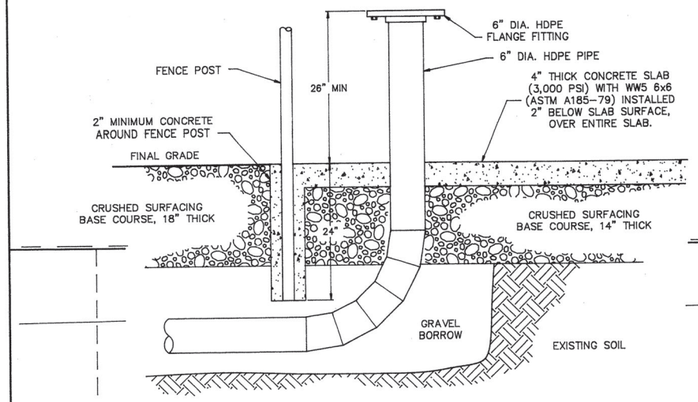
VICINITY MAP AND INDEX OF DRAWINGS

SURVEY NO.

SHEET G1

Plan'd 12/7/96 Ref. Sect.# 3321 & Co. PW Project #91-951 file: Sect. 3321

DigiPrint™



AA / A1 **FLARE PAD SLAB SECTION**
SCALE: 1"=12"

NOTES:

1. ALL PIPES ENTERING COMPOUND SHALL TERMINATE 2'-0" ABOVE FINAL SLAB GRADE. SPACING BETWEEN ALL PIPES SHALL BE A MINIMUM OF (2) PIPE DIAMETERS, OR AS DIRECTED BY THE ENGINEER.
2. LABEL ALL PIPE CLEARLY WITH TERMINUS LOCATION.
3. ALL PIPE RISERS SHALL BE PLUMB, AND ALIGN WITH THE OTHERS IN THE ROW.

1 / A1 **FLARE PAD SLAB DETAIL**
NOT TO SCALE

NOTES:

1. FOR FLARE PAD EQUIPMENT LAYOUT, SEE DETAIL 1, SHEET M2 OF CONSTRUCTION PLANS.

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 19983 — REGISTERED PROFESSIONAL ENGINEER
4/2/95
EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\M2.DWG

PLAN CHECK	BY	DATE					
			7/10/95	1	EXPANDED SLAB 5' TO SW	MJF	
			DATE	NO.	REVISION	BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		1 OF 1

DESIGNED BY: MARTIN FOX — DRAWN BY: MARTIN FOX
DATE APPROVED: — FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

EDGE OF GRAVEL SURFACING

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

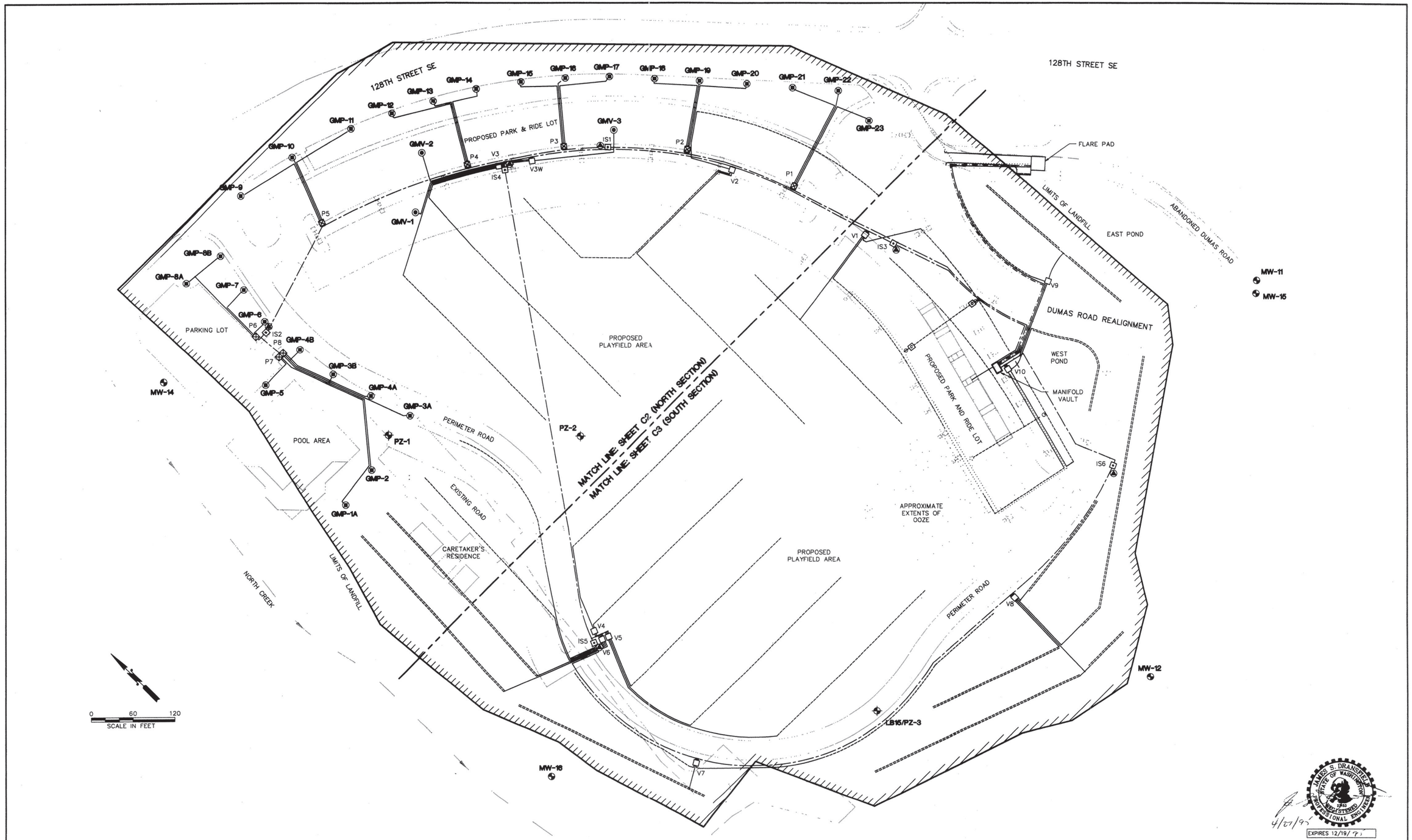
ADDENDUM 01: FLARE PAD SLAB DETAIL

SURVEY NO.

SHEET A1 REV 1

filmed 12/17/96

Sht. 33 of



JAMES S. DRANSFIELD — STATE OF WASHINGTON — 9753 — REGISTERED PROFESSIONAL ENGINEER

4/27/95

EXPIRES 12/19/ 7

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C1.DWG

PLAN CHECK	BY	DATE					BY
			DATE	NO.	REVISION		BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		2 OF 10

DESIGNED BY: MARTIN FOX — DRAWN BY: MARTIN FOX

DATE APPROVED: — FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

SITE PLAN WITH SYSTEM LAYOUT

SURVEY NO.

SHEET C1

12/17/96

DigiPrint™

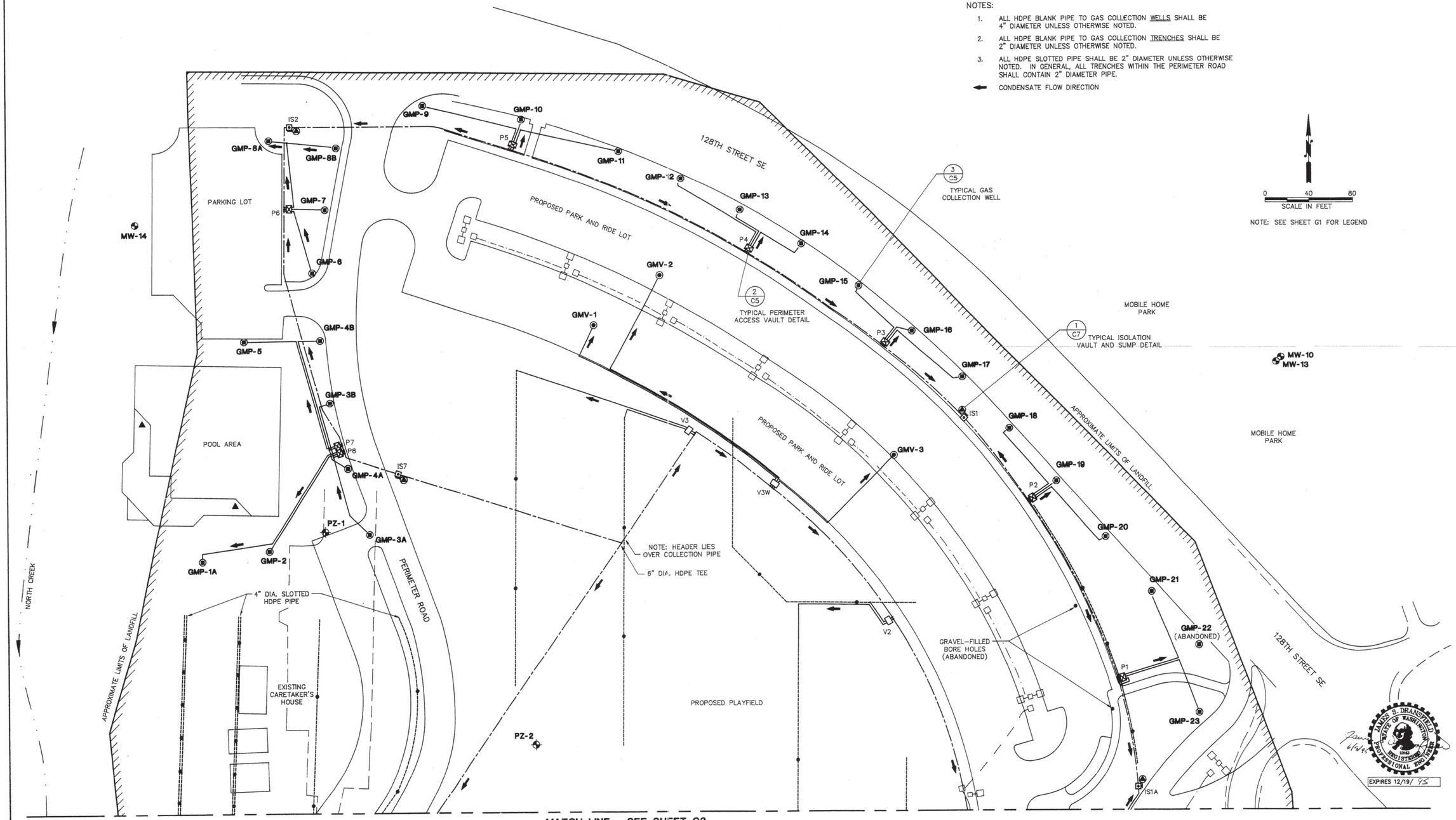
NOTES:

1. ALL HDPE BLANK PIPE TO GAS COLLECTION WELLS SHALL BE 4" DIAMETER UNLESS OTHERWISE NOTED.
2. ALL HDPE BLANK PIPE TO GAS COLLECTION TRENCHES SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED.
3. ALL HDPE SLOTTED PIPE SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED. IN GENERAL, ALL TRENCHES WITHIN THE PERIMETER ROAD SHALL CONTAIN 2" DIAMETER PIPE.

CONDENSATE FLOW DIRECTION

0 40 80
SCALE IN FEET

NOTE: SEE SHEET G1 FOR LEGEND



MATCH LINE - SEE SHEET C3

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C2-R1.DWG

PLAN CHECK	BY	DATE					
		5/17/95	1	SPLIT VENT & PERIMETER SYSTEMS		MJF	
		DATE	NO.	REVISION		BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		3 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX

DATE APPROVED: | FIELD BOOK(S):

AGRA Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. 11-07764-04

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

PIPING LAYOUT NORTH SECTION

SURVEY NO.

SHEET C2 REV 1

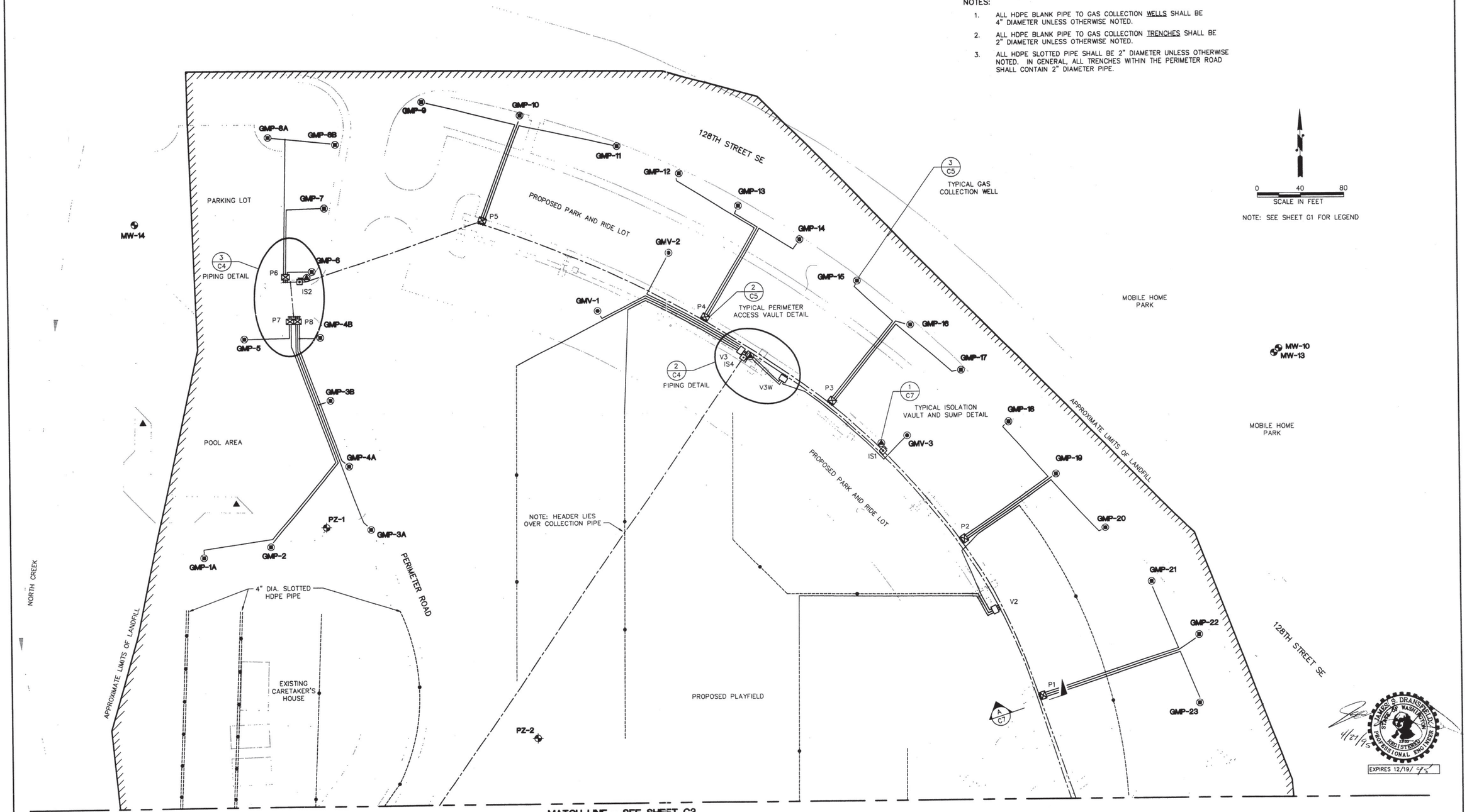
JAMES S. DRANSFIELD STATE OF WASHINGTON 12983 REGISTERED PROFESSIONAL ENGINEER
6/5/95
EXPIRES 12/19/95

Filmed 12/17/96

SHT. 33 of 21

NOTES:

1. ALL HDPE BLANK PIPE TO GAS COLLECTION WELLS SHALL BE 4" DIAMETER UNLESS OTHERWISE NOTED.
2. ALL HDPE BLANK PIPE TO GAS COLLECTION TRENCHES SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED.
3. ALL HDPE SLOTTED PIPE SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED. IN GENERAL, ALL TRENCHES WITHIN THE PERIMETER ROAD SHALL CONTAIN 2" DIAMETER PIPE.



NOTE: SEE SHEET G1 FOR LEGEND

JAMES S. DRANSFIELD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — 4/21/95

EXPIRES 12/19/ 97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C2.DWG

PLAN CHECK	BY	DATE					
			DATE	NO.	REVISION		BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		3 OF 10

DESIGNED BY: MARTIN FOX — DRAWN BY: MARTIN FOX

DATE APPROVED: — FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. 11-07764-04

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

PIPING LAYOUT NORTH SECTION

SURVEY NO.

SHEET C2

filmed 12/17/96

Sys. 3321

DigiPrint™

MATCH LINE - SEE SHEET C2

4' DIA. SLOTTED HDPE PIPE

CAP EXISTING 2" DIA. HDPE SLOTTED PIPE WHERE ENCOUNTERED

NORTH CREEK

APPROXIMATE LIMITS OF LANDFILL

PARKING LOT

PERIMETER ROAD

IS4

V4

V6

V5

C7

TYPICAL "TYPE I" GAS COLLECTION TRENCH

1 C6

MW-16

4' DIA. SLOTTED HDPE PIPE

V7

EXISTING PARKING LOT

IS5

LB15/PZ-3

PERIMETER ROAD

(3) EXISTING 2" DIA. HDPE HEADERS TO BE ABANDONED IN PLACE

EXISTING BUILDING

EXISTING BUILDING

1 C5 TYPICAL VENT SYSTEM ACCESS VAULT

V8

4' DIA. SLOTTED HDPE PIPE

2 C6 TYPICAL "TYPE II" GAS COLECTION TRENCH

MW-12

EXISTING MONUMENT: VALVE TO BE PLACED IN "CLOSED" POSITION AND ABANDONED

EXISTING HDPE HEADER TO BE ABANDONED IN PLACE

CAP EXISTING HDPE SLOTTED PIPE WHERE ENCOUNTERED

EXISTING MONUMENT TO BE ABANDONED: SALVAGE VALVE (IF POSSIBLE) AND CAP EXISTING SLOTTED PIPE

CAP EXISTING HDPE SLOTTED PIPE WHERE ENCOUNTERED

APPROXIMATE EXTENT OF OOZE

V1

IS3

PROPOSED PARK AND RIDE LOT

PROPOSED RESTROOM

PROPOSED COFFEE STAND

PROPOSED BUS SHELTER

1 M1 MANIFOLD VAULT DETAIL

V10

1 C4 PIPING DETAIL

CAP EXISTING 2" DIA. VENT LINES WHEN ENCOUNTERED (2 PLACES)

EXISTING MONUMENT: VALVE TO BE PLACED IN "OPEN" POSITION AND ABANDONED

WEST POND

4' DIA. SLOTTED HDPE PIPE

DUMAS ROAD REALIGNMENT

EAST POND

EXISTING MONUMENT: VALVE TO BE PLACED IN "OPEN" POSITION AND ABANDONED

V9

C7

IS6

1 C7 TYPICAL ISOLATION VAULT AND SUMP DETAIL

FLARE PAD ACCESS ROAD (REFER TO "McCOLLUM PARK REDEVELOPMENT, PHASE 2, REVISED GRADING AND DRAINAGE" BY PERTEET ENGINEERING, DATED 4/25/95, FOR REVISED GRADING PLAN OF THIS AREA)

NATURAL GAS LINE TO BE INSTALLED BY OTHERS (APPROXIMATE LOCATION)

EXISTING BERM

1 M2 FLARE PAD DETAIL

4' DIA. SLOTTED HDPE PIPE

APPROXIMATE LIMITS OF LANDFILL

EAST POND

ABANDONED DUMAS ROAD

DUMAS ROAD REALIGNMENT

MW-11

MW-15

0 40 80

SCALE IN FEET

NOTE: SEE SHEET G1 FOR LEGEND

NOTES:

1. ALL HDPE BLANK PIPE TO GAS COLLECTION WELLS SHALL BE 4" DIAMETER UNLESS OTHERWISE NOTED.
2. ALL HDPE BLANK PIPE TO GAS COLLECTION TRENCHES SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED.
3. ALL HDPE SLOTTED PIPE SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED. IN GENERAL, ALL TRENCHES WITHIN THE PERIMETER ROAD SHALL CONTAIN 2" DIAMETER PIPE.

← CONDENSATE FLOW DIRECTION

JAMES S. DRANSFIELD STATE OF WASHINGTON 20963 REGISTERED PROFESSIONAL ENGINEER

4/8/95

EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07784-04\C3-R1.DWG

PLAN CHECK	BY	DATE					
		5/17/95	1	SPLIT VENT & PERIMETER SYSTEMS	MJF		
		DATE	NO.	REVISION	BY		

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		4 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX

DATE APPROVED: | FIELD BOOK(S):

AGRA Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

PIPING LAYOUT SOUTH SECTION

SURVEY NO.

SHEET C3 REV 1

filed 12/17/96

SWA 8324

MATCH LINE - SEE SHEET C2

4' DIA. SLOTTED HDPE PIPE

NORTH CREEK

PARKING LOT

PERIMETER ROAD

APPROXIMATE LIMITS OF LANDFILL

IS5 V4 V6 V5

C C7

4 C4 PIPING DETAIL

TYPICAL "TYPE I" GAS COLLECTION TRENCH 1 C6

MW-16

4' DIA. SLOTTED HDPE PIPE

V7

EXISTING PARKING LOT

EXISTING BUILDING

EXISTING BUILDING

LB15/PZ-3

PERIMETER ROAD

(3) EXISTING 2" DIA. HDPE HEADERS TO BE ABANDONED IN PLACE

V8

1 C5 TYPICAL VENT SYSTEM ACCESS VAULT

4' DIA. SLOTTED HDPE PIPE

2 C6 TYPICAL "TYPE II" GAS COLECTION TRENCH

MW-12

CAP EXISTING 2" DIA. HDPE SLOTTED PIPE WHERE ENCOUNTERED

V1

IS3

4' DIA. SLOTTED HDPE PIPE

PROPOSED PARK AND RIDE LOT

DUMAS ROAD REALIGNMENT

GRAVEL ROAD: FILL TO MATCH GRADE AT DUMAS ROAD REALIGNMENT; SLOPE 5% DOWN TO PARKING AREA AND FLARE PAD

NATURAL GAS LINE TO BE INSTALLED BY OTHERS (APPROXIMATE LOCATION)

EXISTING BERM

1 M2 FLARE PAD DETAIL

ABANDONED DUMAS ROAD

EAST POND

APPROXIMATE LIMITS OF LANDFILL

EAST POND

EXISTING MONUMENT: VALVE TO BE PLACED IN "CLOSED" POSITION AND ABANDONED

EXISTING MONUMENT: VALVE TO BE PLACED IN "OPEN" POSITION AND ABANDONED

EXISTING HDPE HEADER TO BE ABANDONED IN PLACE

CAP EXISTING HDPE SLOTTED PIPE WHERE ENCOUNTERED

EXISTING MONUMENT TO BE ABANDONED: SALVAGE VALVE (IF POSSIBLE) AND CAP EXISTING SLOTTED PIPE

CAP EXISTING HDPE SLOTTED PIPE WHERE ENCOUNTERED

APPROXIMATE EXTENT OF OOZE

PROPOSED RESTROOM

PROPOSED COFFEE STAND

PROPOSED BUS SHELTER

1 M1 MANIFOLD VAULT DETAIL

C C7

V9

V10

1 C4 PIPING DETAIL

CAP EXISTING 2" DIA. VENT LINES WHEN ENCOUNTERED (2 PLACES)

4' DIA. SLOTTED HDPE PIPE

WEST POND

EXISTING MONUMENT: VALVE TO BE PLACED IN "OPEN" POSITION AND ABANDONED

B C7

IS6

1 C7 TYPICAL ISOLATION VAULT AND SUMP DETAIL

4' DIA. SLOTTED HDPE PIPE

DUMAS ROAD REALIGNMENT

MW-11

MW-15

0 40 80

SCALE IN FEET

NOTE: SEE SHEET G1 FOR LEGEND

NOTES:

1. ALL HDPE BLANK PIPE TO GAS COLLECTION WELLS SHALL BE 4" DIAMETER UNLESS OTHERWISE NOTED.
2. ALL HDPE BLANK PIPE TO GAS COLLECTION TRENCHES SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED.
3. ALL HDPE SLOTTED PIPE SHALL BE 2" DIAMETER UNLESS OTHERWISE NOTED. IN GENERAL, ALL TRENCHES WITHIN THE PERIMETER ROAD SHALL CONTAIN 2" DIAMETER PIPE.

JAMES S. DRANSFIELD STATE OF WASHINGTON 19511 REGISTERED PROFESSIONAL ENGINEER

4/29/96

EXPIRES 12/19/97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C3.DWG

PLAN CHECK	BY	DATE					
			DATE	NO.	REVISION		BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		4 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX

DATE APPROVED: | FIELD BOOK(S):

AGRA Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD LANDFILL GAS MANAGEMENT SYSTEM

PIPING LAYOUT SOUTH SECTION

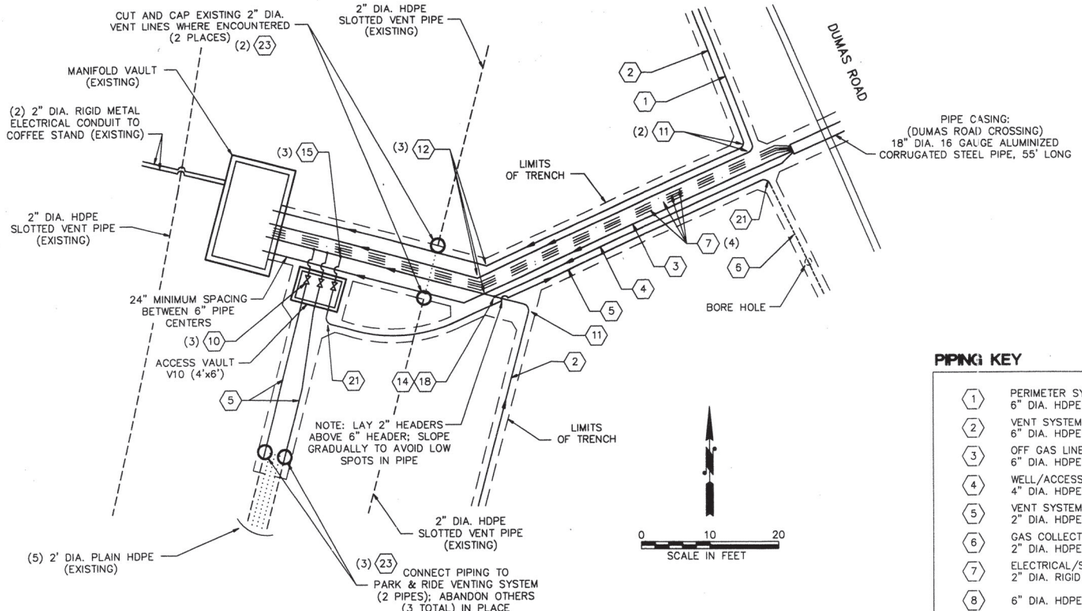
SURVEY NO.

SHEET C3

filmed 12/17/96

file: Sept 3321

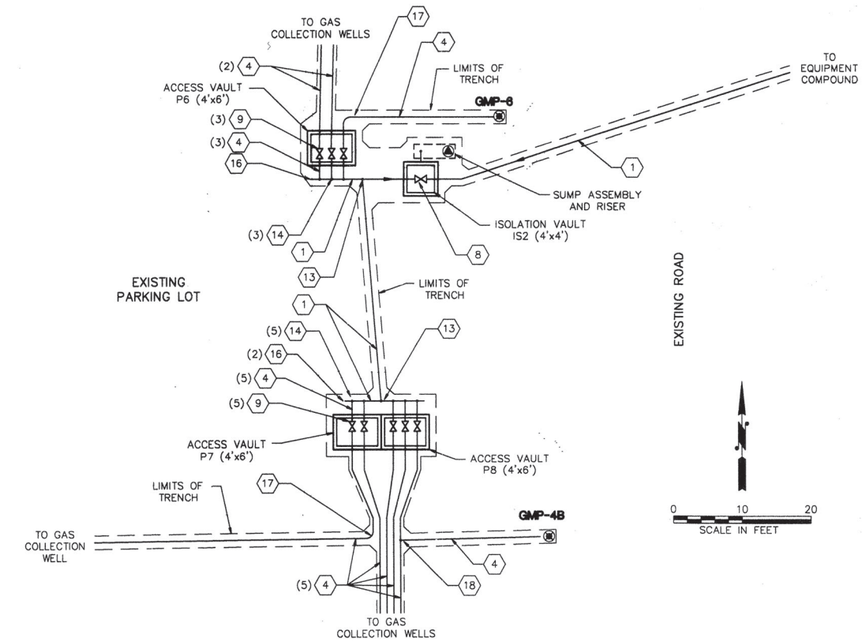
DigiPrint™



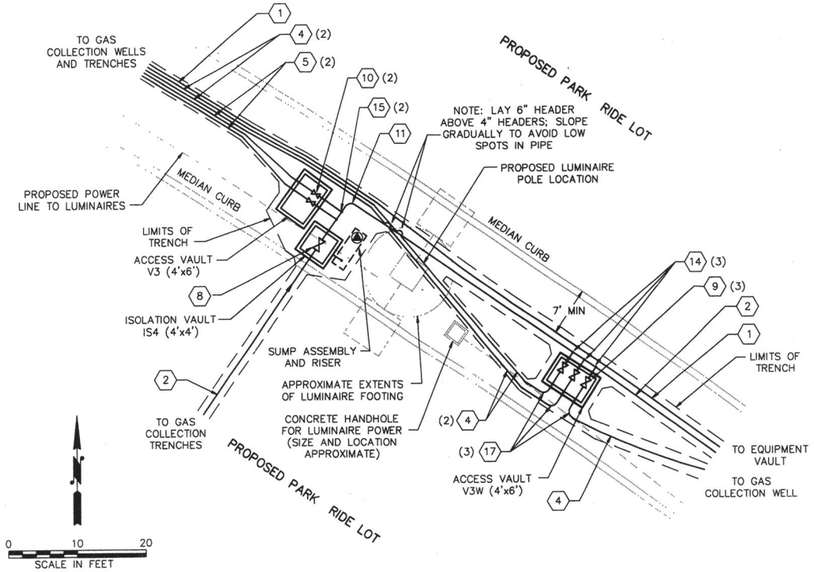
1 / C4 **PIPING DETAIL - EQUIPMENT VAULT AREA**
SCALE: 1"=10'

PIPING KEY

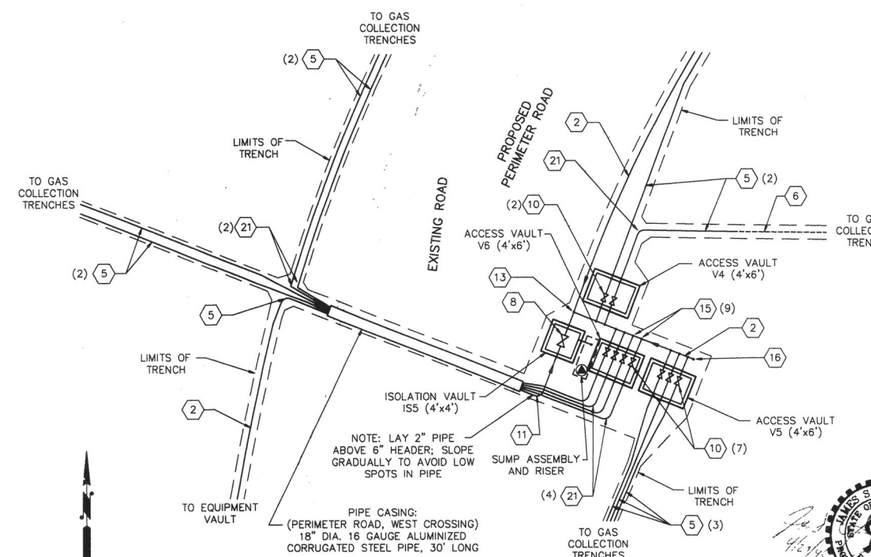
1	PERIMETER SYSTEM HEADER: 6" DIA. HDPE PIPE
2	VENT SYSTEM HEADER: 6" DIA. HDPE PIPE
3	OFF GAS LINE TO FLARE PAD: 6" DIA. HDPE PIPE
4	WELL/ACCESS VAULT HEADER: 4" DIA. HDPE PIPE
5	VENT SYSTEM LATERAL HEADER: 2" DIA. HDPE PIPE
6	GAS COLLECTION VENT PIPE: 2" DIA. HDPE PIPE WITH 0.020" SLOTS
7	ELECTRICAL/SENSOR LINE: 2" DIA. RIGID ELECTRICAL CONDUIT
8	6" DIA. HDPE BALL VALVE, FLANGED
9	4" DIA. HDPE BALL VALVE, FLANGED
10	2" DIA. HDPE BALL VALVE, FLANGED
11	6" DIA. HDPE ELBOW, SWEEP 90
12	6" DIA. HDPE ELBOW, 45
13	6" DIA. HDPE TEE
14	6 x 6 x 4 HDPE REDUCER TEE
15	6 x 6 x 2 HDPE REDUCER TEE
16	6" DIA. HDPE END CAP
17	4" DIA. HDPE ELBOW, SWEEP 90
18	4" DIA. HDPE ELBOW, 45
19	4" DIA. HDPE TEE
20	4 x 4 x 2 HDPE REDUCER TEE
21	2" DIA. HDPE ELBOW, SWEEP 90
22	2" DIA. HDPE ELBOW, 45
23	2" DIA. HDPE END CAP
(2) X	INDICATES NUMBER OF PIPE/FITTINGS (IF GREATER THAN ONE)
	INDICATES GENERAL DOWN SLOPE OF PIPE
	APPROXIMATE LIMITS OF TRENCH



3 / C4 **PIPING DETAIL - VAULTS P6, P7 AND P8**
SCALE: 1"=10'



2 / C4 **PIPING DETAIL - VAULTS V3 AND V3W**
SCALE: 1"=10'



4 / C4 **PIPING DETAIL - VAULTS V4, V5 AND V6**
SCALE: 1"=10'

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 22183 — REGISTERED PROFESSIONAL ENGINEER
4/6/94
EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C4.DWG

PLAN CHECK	BY	DATE	DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		5 OF 10

DESIGNED BY: MARTIN FOX — DRAWN BY: MARTIN FOX
DATE APPROVED: — FIELD BOOK(S):

AGRA Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS
PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

PIPING DETAILS

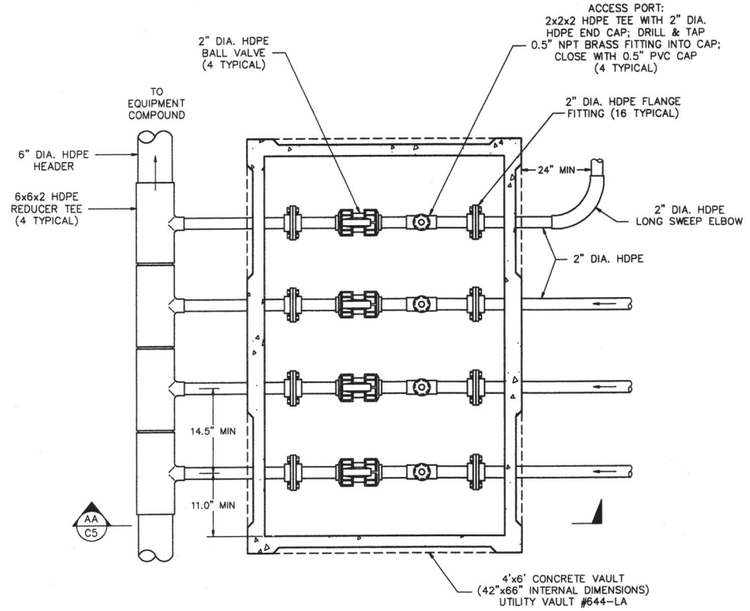
SURVEY NO.

SHEET C4

filmed 12/17/96

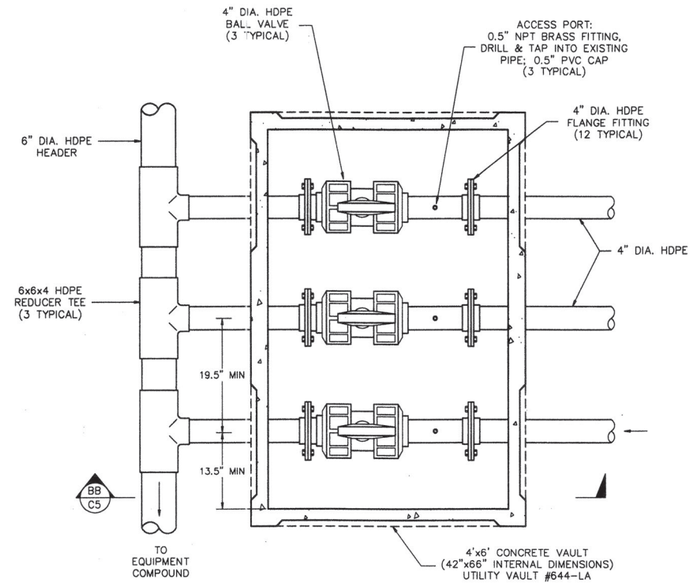
Sec 3821

DigiPrint™



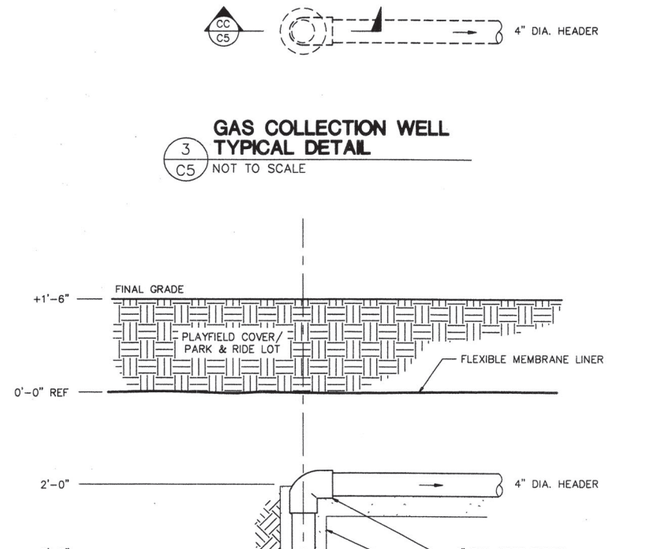
VENT SYSTEM ACCESS VAULT V8 (PLAN VIEW)

1 / C5 SCALE: 1"=12"



PERIMETER SYSTEM ACCESS VAULT P4 (TYPICAL PLAN VIEW)

2 / C5 SCALE: 1"=12"

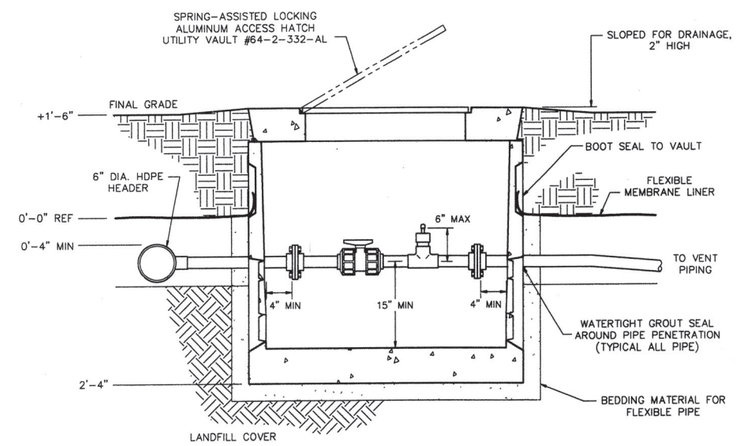


GAS COLLECTION WELL TYPICAL DETAIL

3 / C5 NOT TO SCALE

1' 0 1'

SCALE: 1"=1'-0"

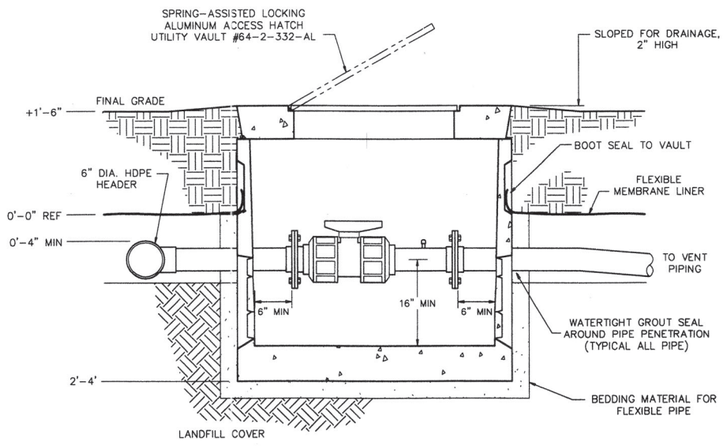


VENT SYSTEM ACCESS VAULT V8 (TYPICAL SECTION VIEW)

AA / C5 SCALE: 1"=12"

1' 0 1'

SCALE: 1"=1'-0"



PERIMETER SYSTEM ACCESS VAULT P4 (TYPICAL SECTION VIEW)

BB / C5 SCALE: 1"=12"

GAS COLLECTION WELL TYPICAL SECTION

CC / C5 NOT TO SCALE

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 20913 — REGISTERED PROFESSIONAL ENGINEER — 4/27/95

EXPIRES 12/19/

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C5.DWG

PLAN CHECK	BY	DATE					
			DATE	NO.	REVISION		BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		6 OF 10
DESIGNED BY: MARTIN FOX		DRAWN BY: MARTIN FOX	
DATE APPROVED:		FIELD BOOK(S):	

AGRA
Earth & Environmental
11335 N.E. 122rd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD LANDFILL GAS MANAGEMENT SYSTEM

ACCESS VAULTS AND WELL DETAILS AND SECTIONS

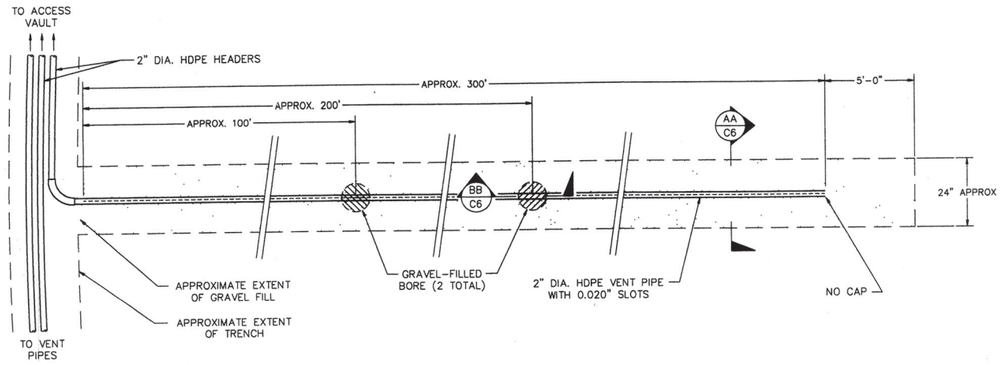
SURVEY NO.

SHEET C5

filmed 12/17/96

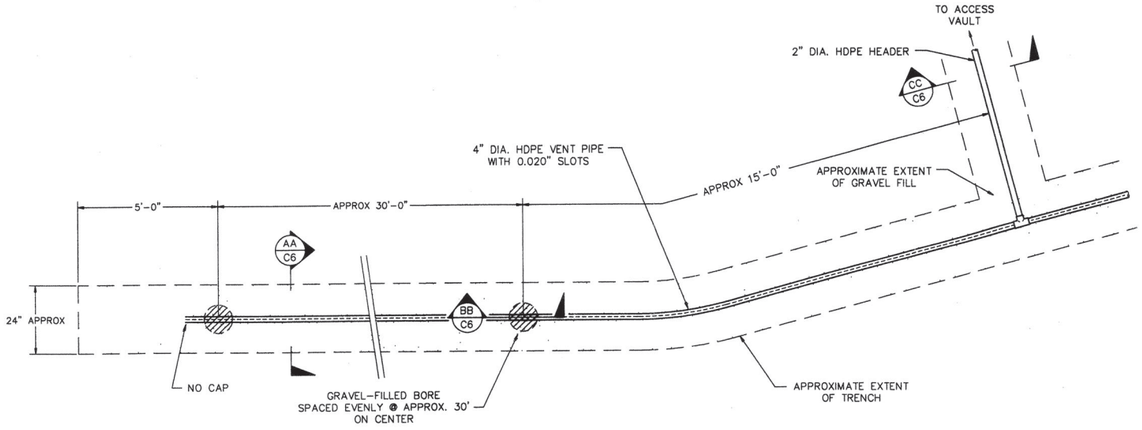
Sno. 332

DigiPrint™



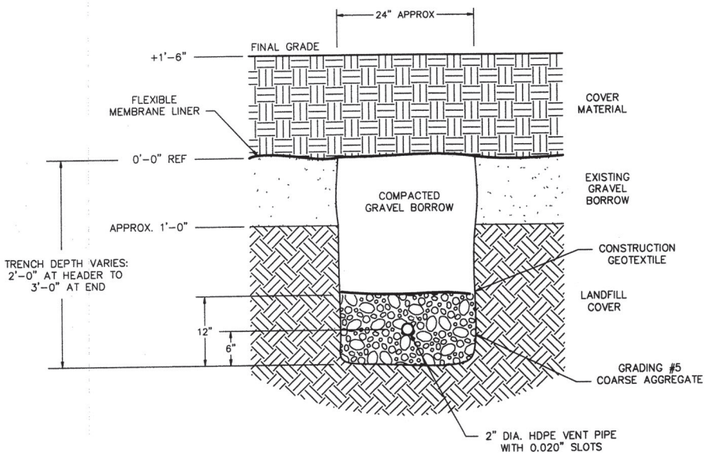
GAS COLLECTION TRENCH "TYPE I" TYPICAL DETAIL

1 / C6 NOT TO SCALE



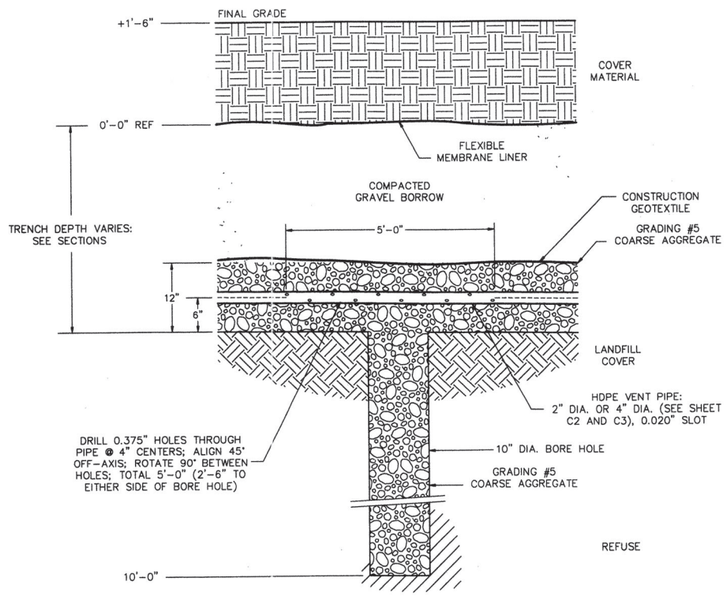
GAS COLLECTION TRENCH "TYPE II" TYPICAL DETAIL

2 / C6 NOT TO SCALE



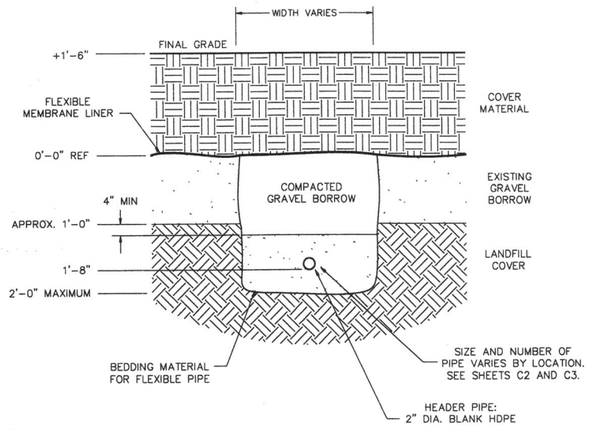
GAS COLLECTION TRENCH "TYPES I & II" TYPICAL SECTION

AA / C6 NOT TO SCALE



GRAVEL-FILLED BORE, TYPICAL SECTION

BB / C6 NOT TO SCALE



HEADER TRENCH "TYPE III" TYPICAL SECTION

CC / C6 NOT TO SCALE

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 12921 — REGISTERED PROFESSIONAL ENGINEER

4/27/15

EXPIRES 12/19/15

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C6.DWG

PLAN CHECK	BY	DATE	DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		7 OF 10

DESIGNED BY: MARTIN FOX — DRAWN BY: MARTIN FOX

DATE APPROVED: — FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

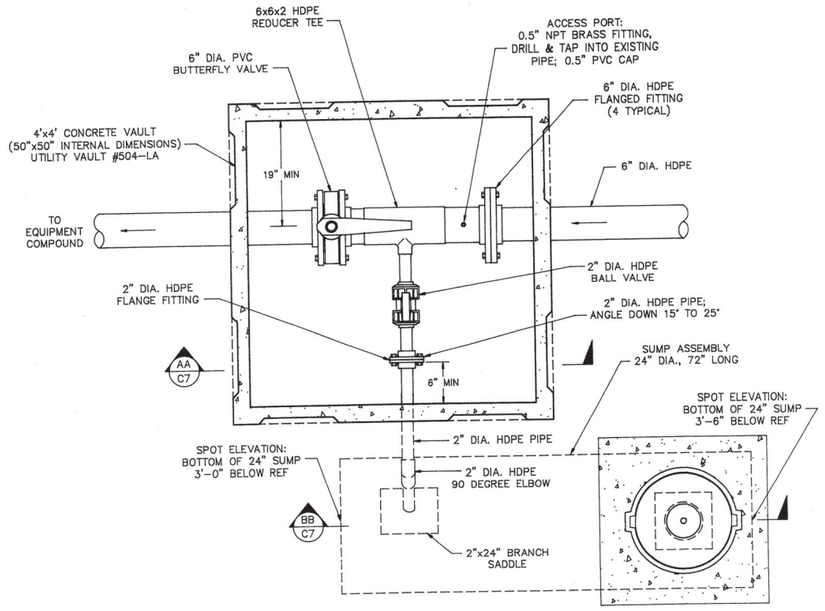
GAS COLLECTION TRENCH DETAILS AND SECTIONS

SURVEY NO.

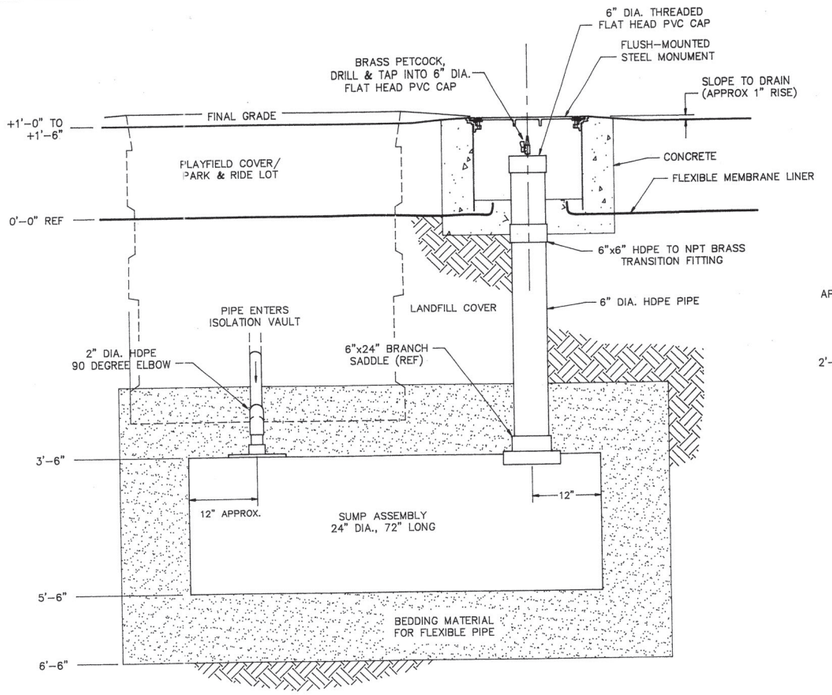
SHEET C6

12/17/96

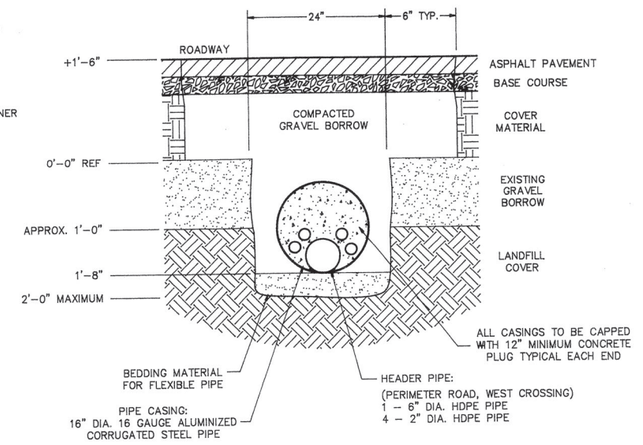
Job No. 3321



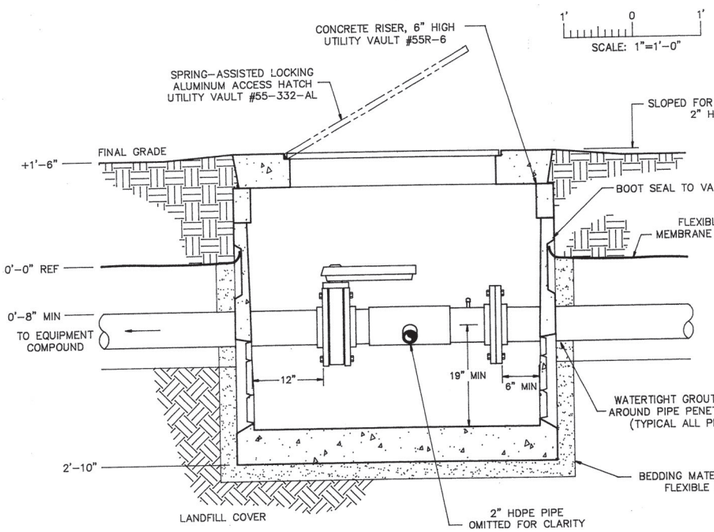
1 C7 **ISOLATION VAULT AND SUMP DETAIL**
SCALE: 1"=12"



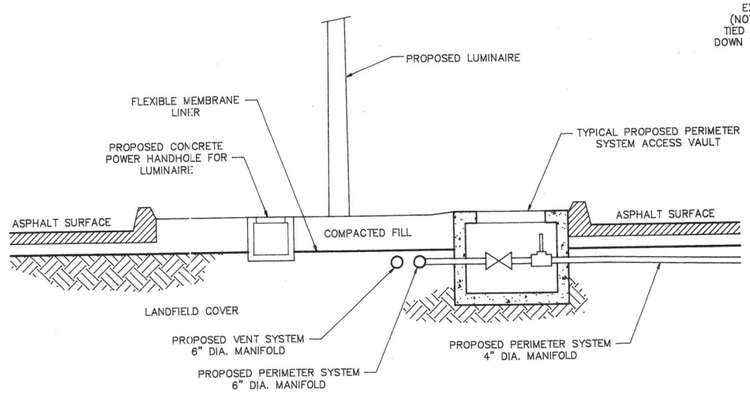
3B C7 **SUMP ASSEMBLY (TYPICAL SECTION)**
NOT TO SCALE



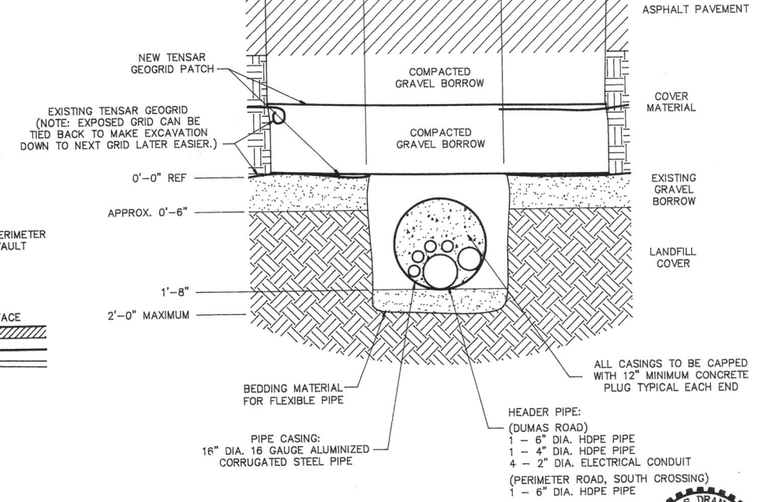
B C7 **PERIMETER ROAD WEST TRENCH CROSSING**
NOT TO SCALE



AA C7 **ISOLATION VAULT (TYPICAL SECTION)**
SCALE: 1"=12"



A C7 **TYPICAL MEDIAN CROSS SECTION (LOOKING WEST)**
NOT TO SCALE



C C7 **PERIMETER ROAD SOUTH AND DUMAS ROAD TRENCH CROSSINGS**
NOT TO SCALE

JAMES S. DRANGSTVEIT — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
5/2/95
EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C7-R1.DWG

PLAN CHECK	BY	DATE				
		7/27/95	1	ADDED 6" PVC CAP TO SECTION BB	MJF	
		DATE	NO.	REVISION	BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		8 OF 10
DESIGNED BY: MARTIN FOX		DRAWN BY: MARTIN FOX	
DATE APPROVED:		FIELD BOOK(S):	

AGRA Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS
PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

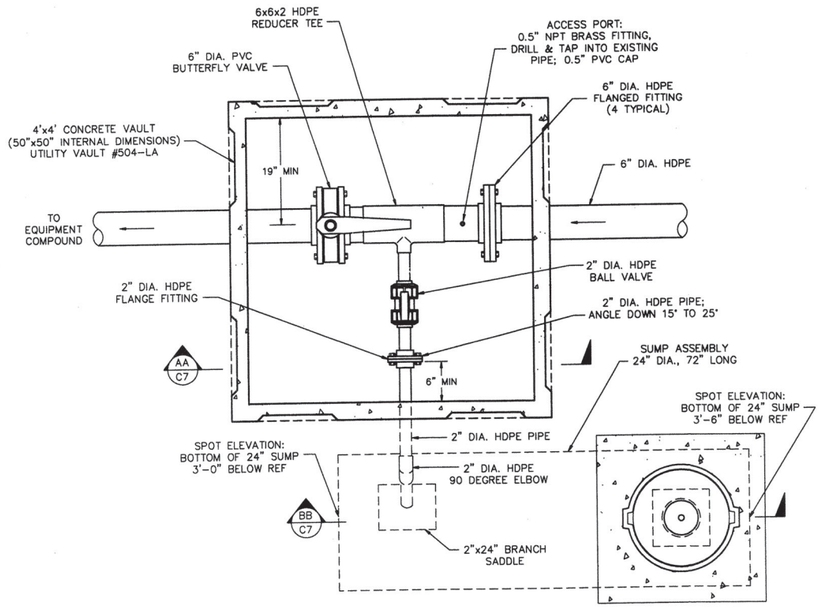
ISOLATION VAULT AND SUMP DETAILS AND SECTIONS

SURVEY NO.

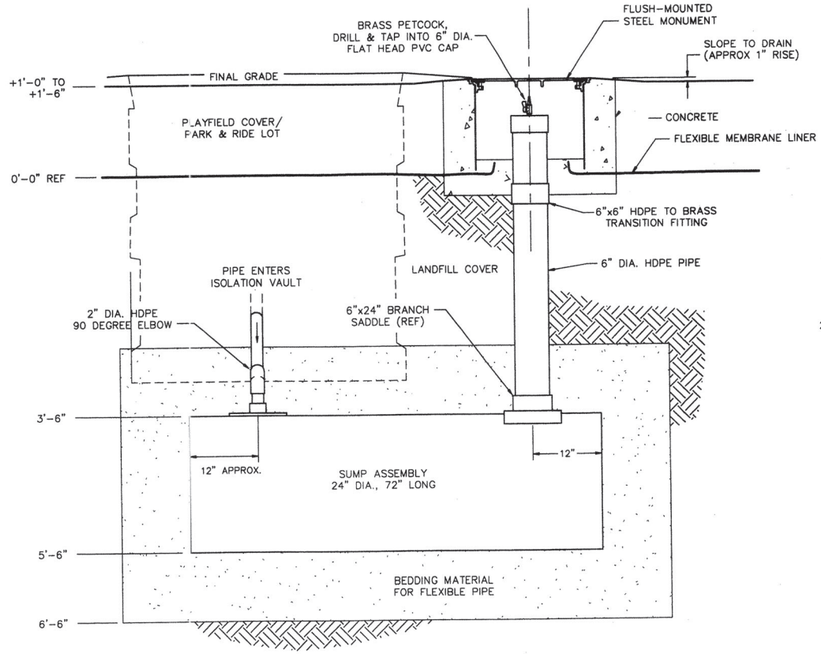
SHEET C7 REV 1

ltr. 4/12/17/96

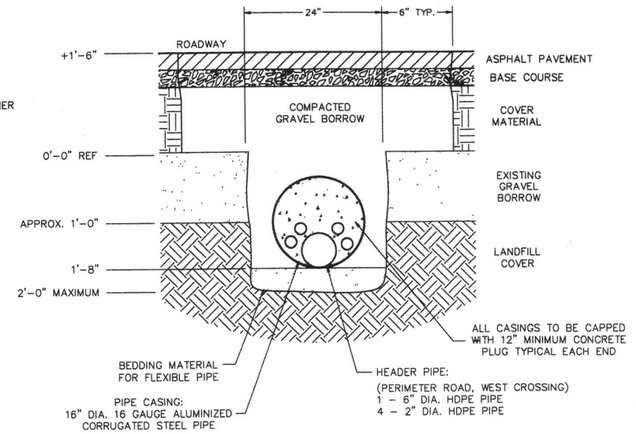
SHR 332.1



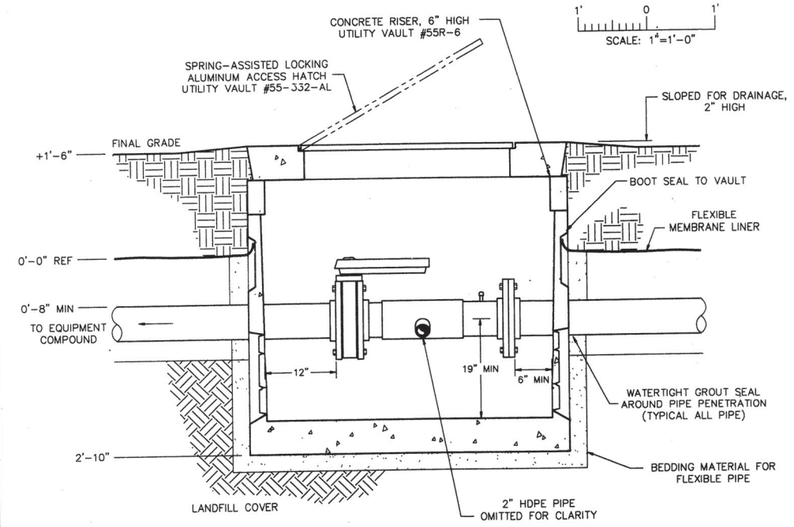
1 C7 **ISOLATION VAULT AND SUMP DETAIL**
SCALE: 1"=12"



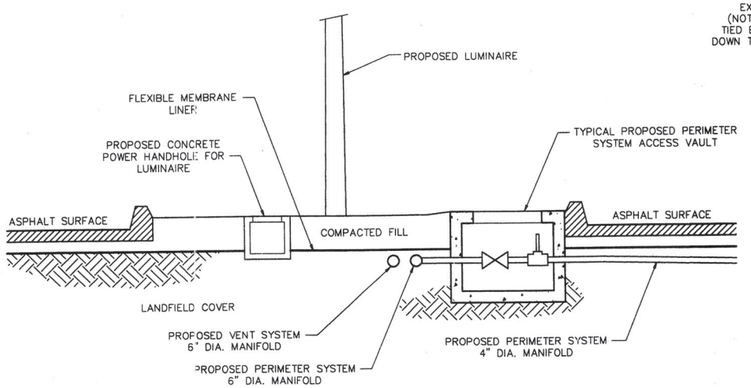
EB C7 **SUMP ASSEMBLY (TYPICAL SECTION)**
NOT TO SCALE



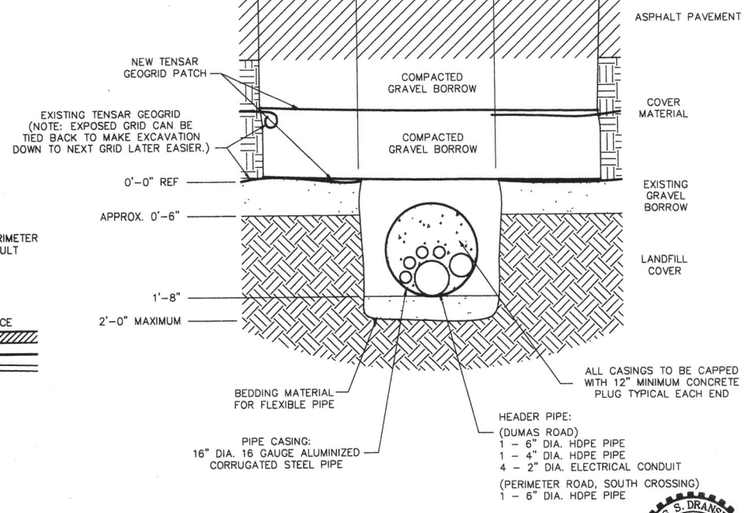
B C7 **PERIMETER ROAD WEST TRENCH CROSSING**
NOT TO SCALE



AA C7 **ISOLATION VAULT (TYPICAL SECTION)**
SCALE: 1"=12"



A C7 **TYPICAL MEDIAN CROSS SECTION (LOOKING WEST)**
NOT TO SCALE



C C7 **PERIMETER ROAD SOUTH AND DUMAS ROAD TRENCH CROSSINGS**
NOT TO SCALE

JAMES S. DRANGSFELD — STATE OF WASHINGTON — 13342 — REGISTERED PROFESSIONAL ENGINEER
1/27/97
EXPIRES 12/19/97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\C7.DWG

PLAN CHECK	BY	DATE	DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		8 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX

DATE APPROVED: | FIELD BOOK(S):

AGRA Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS
PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

ISOLATION VAULT AND SUMP DETAILS AND SECTIONS

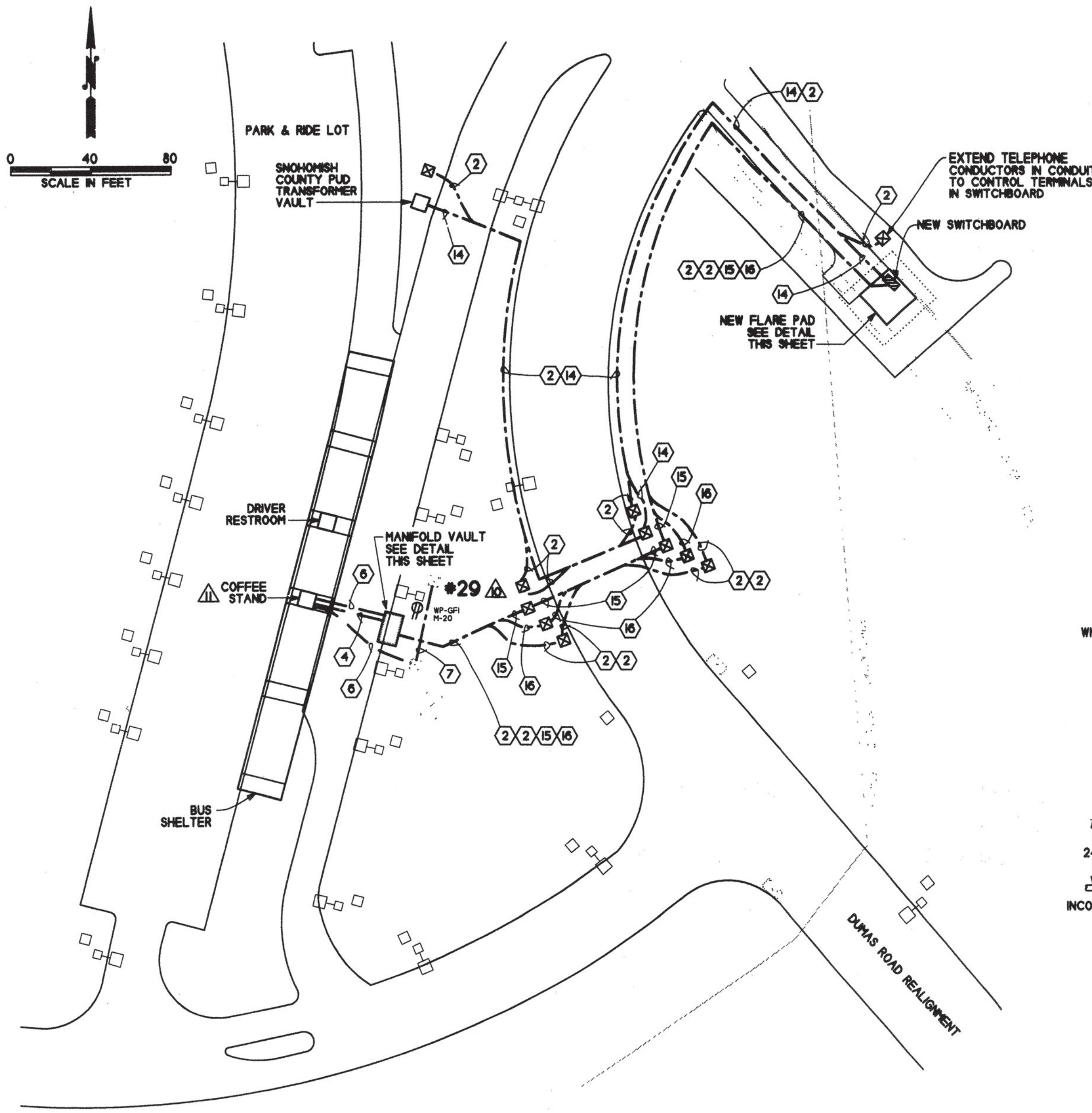
SURVEY NO.

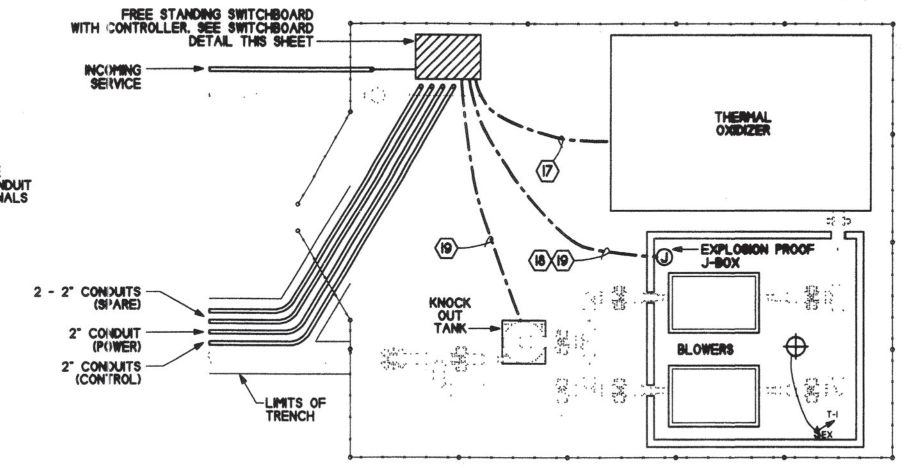
SHEET C7

Revised 12/17/96

Sub. 332.1

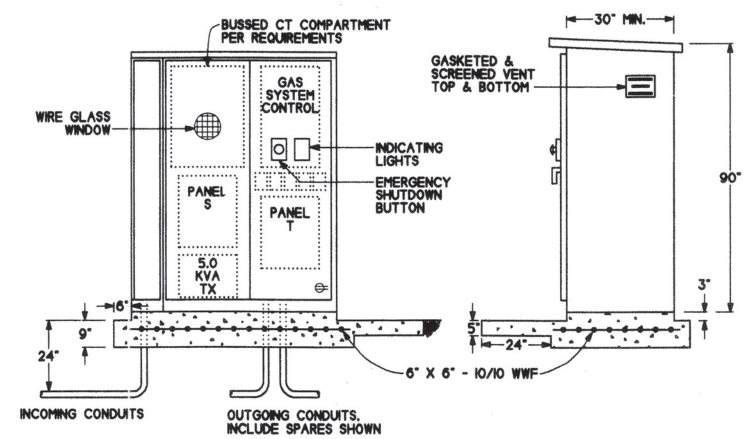
DigiPrint™





FLARE PAD DETAIL

SCALE 1/4" = 1'



SWITCHBOARD DETAIL

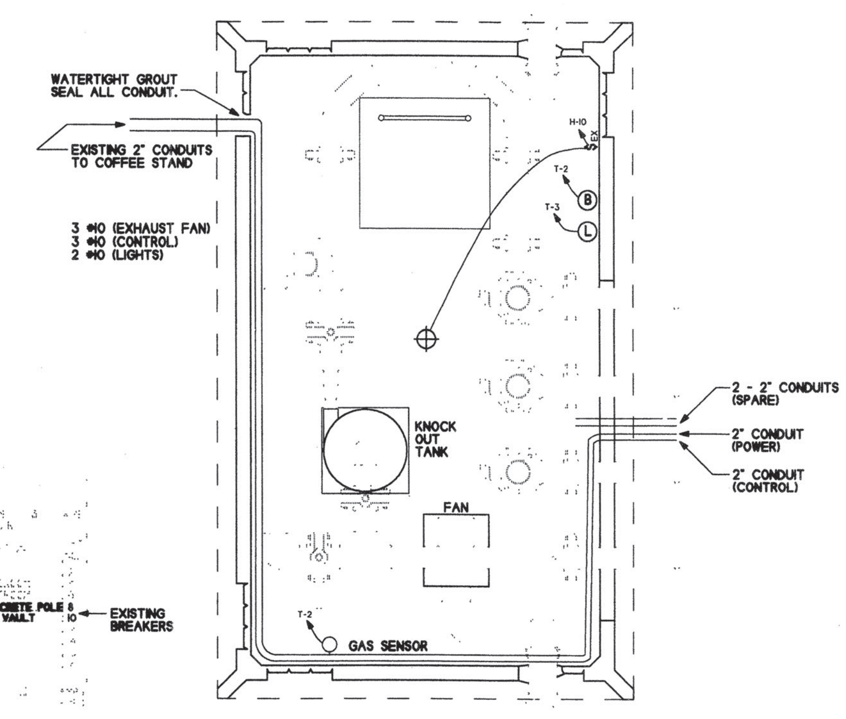
NO SCALE

KEY

⊕	EXPLOSION RESISTANT LUMINAIRE, 120 VOLT, 150 WATT INCANDESCENT. HUBBELL #HLEM120
(B)	EMERGENCY SHUTDOWN BUTTON, EXPLOSION PROOF. ALLEN BRADLEY #4HZ4 OR APPROVED EQUAL
(L)	INDICATOR LIGHTS (TWO EACH), 30.5mm, EXPLOSION PROOF ALLEN BRADLEY #800H OR APPROVED EQUAL
⊠	STRUCTURAL PLASTIC HANDHOLE, SIMILAR TO WSDOT J-IIa TYPE I
WP-GFI	DUPLEX RECEPTACLE 20A., 120 VOLT (WEATHERPROOF COVER, GROUND FAULT INTERRUPTER)
S_{EX}	EXPLOSION PROOF SWITCH SPST SS COVER 20 A. 120 V.
(14)	2" C. 4 #2
(2)	2" C. WITH NYLON PULL STRING (FUTURE OR TELEPHONE)
(4)	EXISTING 2" C. WITH 1 - 25/c BELDON #9948
(6)	EXISTING 2" C. WITH 6 #10, 1 #10 GRND. ADD 2 #10.
(15)	2" C. 1 - 11/c #14, 1 #10 GRND.
(16)	2" C. 2 - SHIELDED CABLE, 18GA/4c BELDON #9418
(17)	2" C. 3 #10, 1 - 11/c #14, 1 #10 GRND.
(18)	2" C. 11 #10, 1 - 11/c #14, 1 #10 GRND.
(19)	1" C. 1 - SHIELDED CABLE, 18GA/4c BELDON #9418

KEY

⚠	REPLACE CONCRETE LIGHTING STANDARD #29 WITH SAME EXCEPT WITH FESTOON OUTLET
⚠	PROVIDE SIZE 0 MOTOR STARTER WITH HOA AND PILOT LIGHT IN COFFEE STAND (EXHAUST FAN)



MANIFOLD VAULT DETAIL

SCALE 1/2" = 1'

20 0.2 RECEPTACLE - CONCRETE POLE 8 ← EXISTING BREAKERS
20 0.2 LIGHTS - MANIFOLD VAULT 10

30 2.4 EXHAUST FAN - MAN VAULT 8 ← EXISTING BREAKER

EXISTING PANEL

PANEL SCHEDULE

NO. S — LOCATION: SWITCHBOARD — SERVING: FLARE PAD — 277/480 VOLTS 3 PHASE 4 WIRE — 100 AMP WITH MAIN BREAKER

CKT NO.	LOAD DESCRIPTION	KVA	TRIP AMPS	TRIP AMPS	KVA	LOAD DESCRIPTION	CKT NO.
1	BLOWER	3.0	30	30	3.0	BLOWER	2
7	THERMAL OXIDIZER	5.0	30	30	1.5	EXHAUST FAN (BLOWER ROOM)	8
13	SPARE		30	30		SPARE	14
19	SPARE		20			SPACE ONLY	20
21	SPARE		20			SPACE ONLY	22
23	SPARE		20			SPACE ONLY	24
25	SPACE ONLY					SPACE ONLY	26
27	SPACE ONLY			20	2.0	5.0 KVA TX TO PANEL T	28
29	SPACE ONLY						

REMARKS:

CONNECTED LOAD: 15.0 KVA 18.0 AMPS
DEMAND LOAD: 100% KVA AMPS

PANEL SCHEDULE

NO. T — LOCATION: SWITCHBOARD — SERVING: FLARE PAD CONTROL — 120/240 VOLTS 1 PHASE 3 WIRE — 50 AMP WITH MAIN BREAKER

CKT NO.	LOAD DESCRIPTION	KVA	TRIP AMPS	TRIP AMPS	KVA	LOAD DESCRIPTION	CKT NO.
1	LIGHTS - BLOWER ROOM	0.5	20	20	0.5	GAS SENSORS \ STOP BUTTONS	2
3	INDICATOR LIGHTS	0.5	20	20		SPARE	4
5	RECEPTACLE - SWITCHBOARD	0.5	20	20		SPARE	6
7	SPARE		20	20		SPARE	8
9	SPARE		20	20		SPARE	10
11	SPARE		20	20		SPARE	12
13	SPACE ONLY					SPACE ONLY	14
15	SPACE ONLY					SPACE ONLY	16
17	SPACE ONLY					SPACE ONLY	18

REMARKS:

CONNECTED LOAD: 2.0 KVA 8.3 AMPS
DEMAND LOAD: 100% KVA AMPS

J. DELVIN ARMSTRONG — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 5 AUGUST 1996
8 June 1995

AS-BUILT

PLAN CHECK	BY	DATE

DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
10	WASH.		E-4

DESIGNED BY: J. D. ARMSTRONG — DRAWN BY: C. B. FOTE
DATE APPROVED: — FIELD BOOK(S):

JD-21 ENGINEERS
1840 - 130th AVENUE N.E. SUITE 15
BELLEVUE, WASHINGTON 98005
(206) 885-2195 FAX (206) 885-9797

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

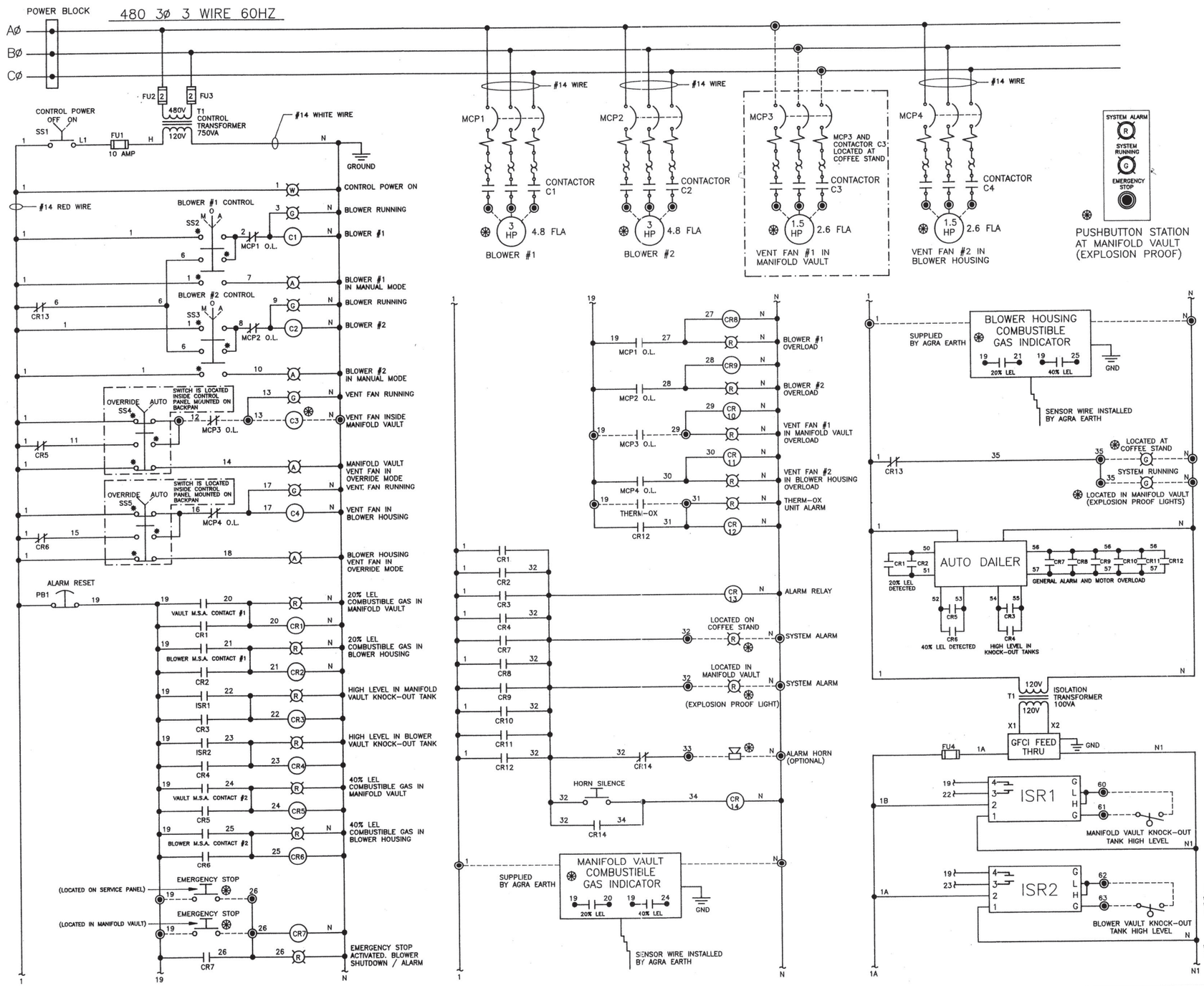
PROJECT NO. W-7764

McCollum Park
PARK & RIDE / TRANSIT CENTER

FLARE PAD ELECTRICAL

SURVEY NO.
SHEET OF SHEETS
1578-E4

PLOT DATE: 8 JUNE 1995



LIST OF MATERIALS

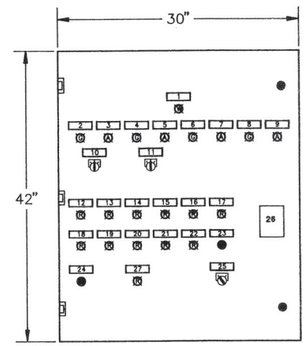
ITEM	QTY	DESCRIPTION	MFGR.

NOTES

- ---- DENOTES WIRING EXTERNAL TO CONTROL PANEL
- ◉ DENOTES TERMINAL INSIDE CONTROL PANEL
- ❋ DENOTES DEVICE NOT SUPPLIED BY SUPERIOR CUSTOM CONTROLS

NAMEPLATES

1—CONTROL POWER ON
2—BLOWER #1 RUNNING
3—BLOWER #1 IN MANUAL MODE
4—BLOWER #2 RUNNING
5—BLOWER #2 IN MANUAL MODE
6—VENT FAN IN MANIFOLD VAULT RUNNING
7—VENT FAN IN MANIFOLD VAULT IN OVERRIDE MODE
8—VENT FAN IN BLOWER HOUSING RUNNING
9—VENT FAN IN BLOWER HOUSING IN OVERRIDE MODE
10—BLOWER #1 CONTROL
11—BLOWER #2 CONTROL
12—20% LEL COMBUSTIBLE GAS IN MANIFOLD VAULT
13—20% LEL COMBUSTIBLE GAS IN BLOWER HOUSING
14—HIGH LEVEL IN MANIFOLD VAULT KNOCK—OUT TANK
15—HIGH LEVEL IN BLOWER KNOCK—OUT TANK
16—40% LEL COMBUSTIBLE GAS IN MANIFOLD VAULT
17—40% LEL COMBUSTIBLE GAS IN BLOWER HOUSING
18—EMERGENCY STOP ACTIVATED
19—BLOWER #1 OVERLOAD
20—BLOWER #2 OVERLOAD
21—VENT FAN IN MANIFOLD VAULT OVERLOAD
22—VENT FAN IN BLOWER HOUSING OVERLOAD
23—ALARM RESET
24—HORN SILENCE
25—CONTROL POWER
26—WARNING 480 VOLTS KEEP OUT
27—THERM—OX UNIT ALARM



SHERMAN K. BURD P.E.
1631 108th AVE. S.E. BELLEVUE, WA 98004
PHONE: (206) 454-3581 FAX: (206) 454-3581

SCALE: 1/8=1" | DATE: 21 JUNE 95 REV 2 | DRAWN BY: MO/MJ

SNOHOMISH DEPARTMENT OF PUBLIC WORKS
McCOLLUM PARK AND RIDE TRANSIT CENTER

LANDFILL GAS MANAGEMENT SYSTEM
CONTROL PANEL SCHEMATIC

DRAWING 2588 E-5

SHERMAN K. BURD — STATE OF WASHINGTON — 11585 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 1-28-97
6-22-95

filmed 12/17/96

Ref. Co. PW Sur # 3321 & Proj. #91-951

AS-BUILT

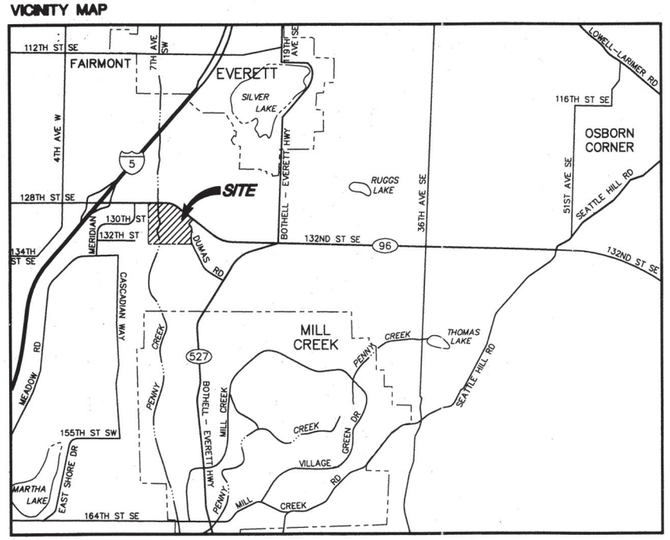
McCOLLUM PARK PROJECT
128th STREET SE AND DUMAS ROAD
SNOHOMISH COUNTY, WASHINGTON

LANDFILL GAS MANAGEMENT SYSTEM
CONSTRUCTION PLAN

INDEX OF DRAWINGS

ADDENDUM TO CONSTRUCTION PLANS:
REPLACE SHEETS 36, 37, 38a, & 38b WITH THE FOLLOWING.

VICINITY MAP



LEGEND

MW-16	EXISTING MONITORING WELL NUMBER AND LOCATION
LB15/PZ-3	EXISTING LANDFILL BORING/PIEZOMETER NUMBER AND LOCATION
GMP-23	PROPOSED GAS MANAGEMENT PERIMETER WELL: 4" DIA. HDPE CASING, 15' DEEP
GMV-3	PROPOSED GAS MANAGEMENT VENT WELL: 4" DIA. HDPE CASING, 15' DEEP
	PROPOSED 4' x 6' CONCRETE ACCESS VAULT (PERIMETER SYSTEM); NOTE SIZE EXAGGERATED FOR CLARITY ON SHEET C1
	PROPOSED 4' x 6' CONCRETE ACCESS VAULT (VENT SYSTEM); NOTE SIZE EXAGGERATED FOR CLARITY ON SHEET C1
	PROPOSED 4' x 4' CONCRETE ISOLATION VAULT
	PROPOSED 4" DIA. CONDENSATE SUMP RISER
----------	PROPOSED GAS MANAGEMENT TRENCH "TYPE I": 2" DIA. SLOTTED HDPE IN GRAVEL-FILLED TRENCH
==========	PROPOSED GAS MANAGEMENT TRENCH "TYPE II": 2" OR 4" DIA. SLOTTED HDPE IN GRAVEL-FILLED TRENCH
————	PROPOSED 2" OR 4" DIA. BLANK HDPE HEADER
—— ——	PROPOSED 6" DIA. BLANK HDPE HEADER
.....	EXISTING 2" OR 4" DIA. HDPE PIPE TO BE ABANDONED IN PLACE
========●=========	PROPOSED 10.5" DIA. HOLLOW STEM AUGER LOCATION; GRAVEL FILLED, 10' DEEP
—·—·—	PROPOSED ELECTRICAL CONDUIT
▲	LOCATION OF PROPOSED AMBIENT COMBUSTIBLE GAS SENSOR/ALARM
	AREA LUMINAIRE ON 12.2 METER CONCRETE POLE, SINGLE AND TANDEM
	CONCRETE HANDHOLE, LUMINAIRE POWER

JAMES S. DRAINSFIELD — STATE OF WASHINGTON — 23921 — REGISTERED PROFESSIONAL ENGINEER

4/27/95

EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\G1.DWG

PLAN CHECK	BY	DATE						
			DATE	NO.	REVISION		BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		1 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX

DATE APPROVED: | FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4569 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

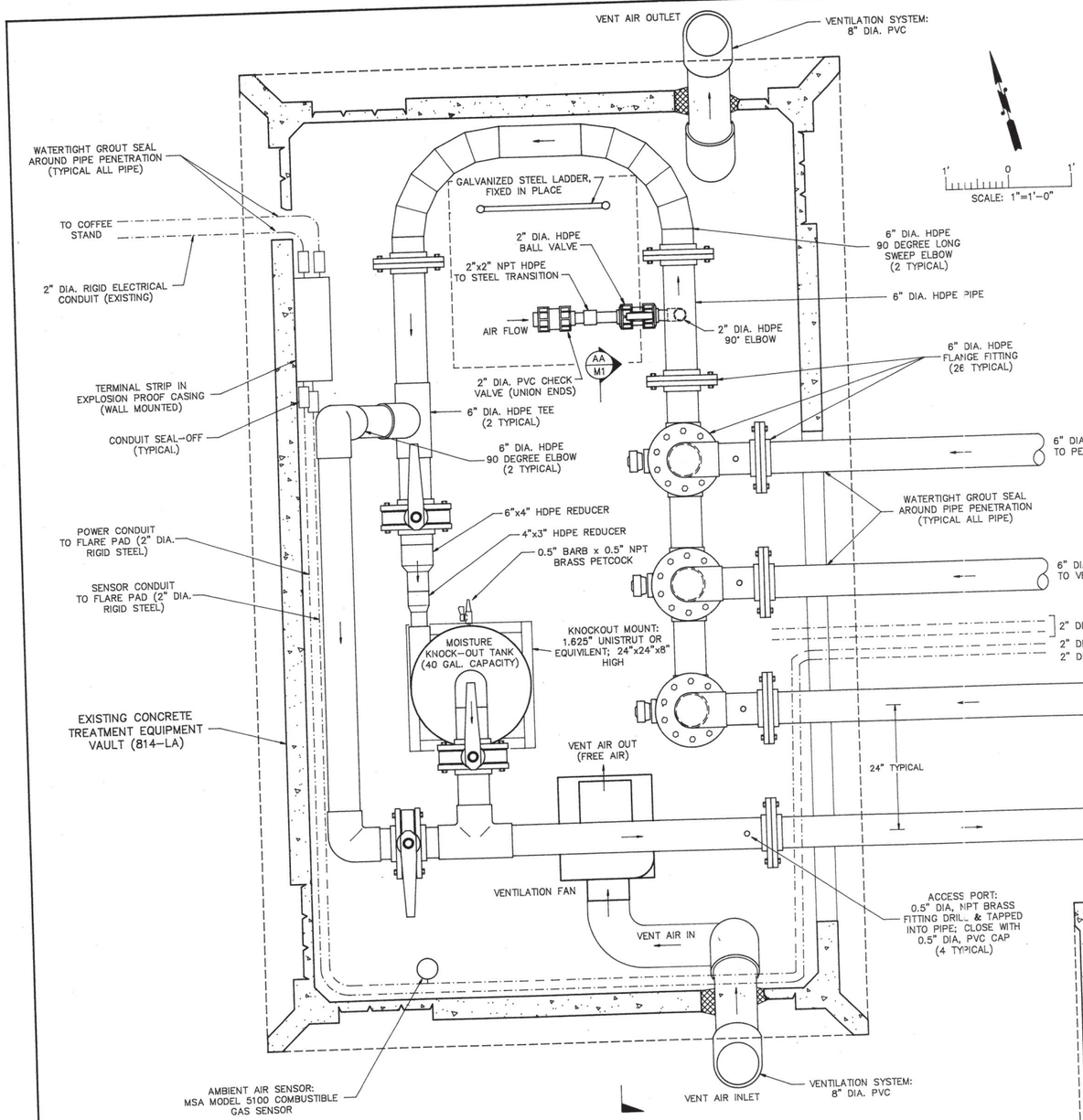
VICINITY MAP AND INDEX OF DRAWINGS

SURVEY NO.

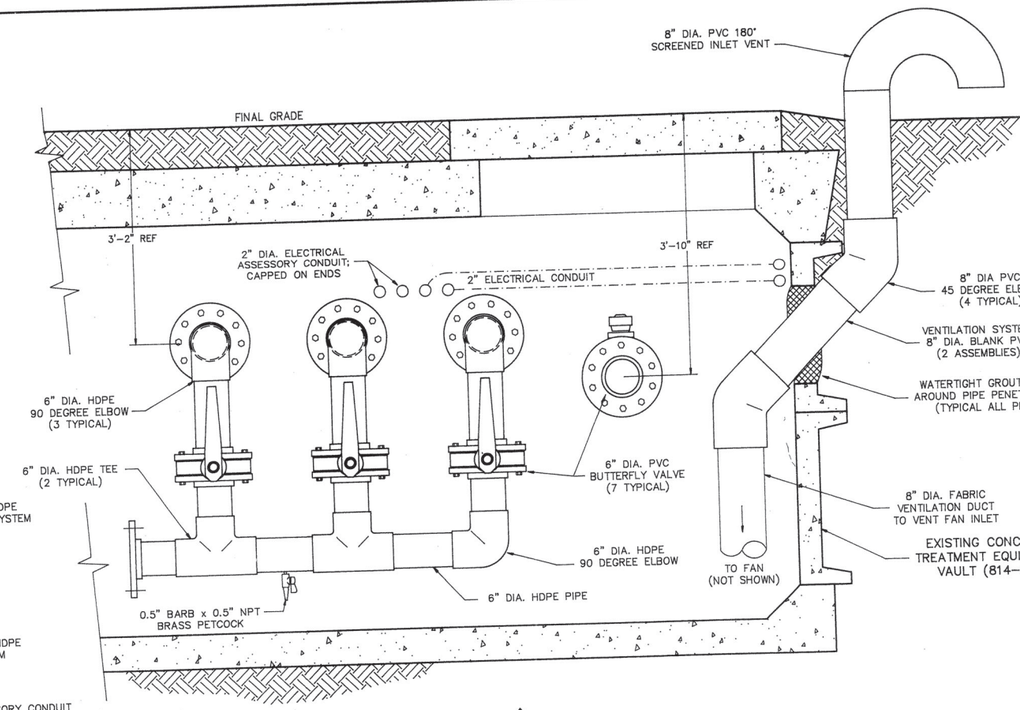
SHEET G1

Plan'd 12/7/96 Ref. Sect.# 3321 & Co. PW Project #91-951 file: Sect. 3321

DigiPrint™



1 / M1 MANIFOLD VAULT LAYOUT
SCALE; 1"-12"



AA / M1 VAULT ELEVATION: EAST WALL
NOT TO SCALE

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 20866 — REGISTERED PROFESSIONAL ENGINEER
9/21/95
EXPIRES 12/19/97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\M1-R1.DWG

PLAN CHECK	BY	DATE

DATE	NO.	REVISION	BY
10/2/95	1	ADDED BLEED AND CHECK VALVE	MJF

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		9 OF 10

DESIGNED BY: MARTIN FOX — DRAWN BY: MARTIN FOX

DATE APPROVED: — FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

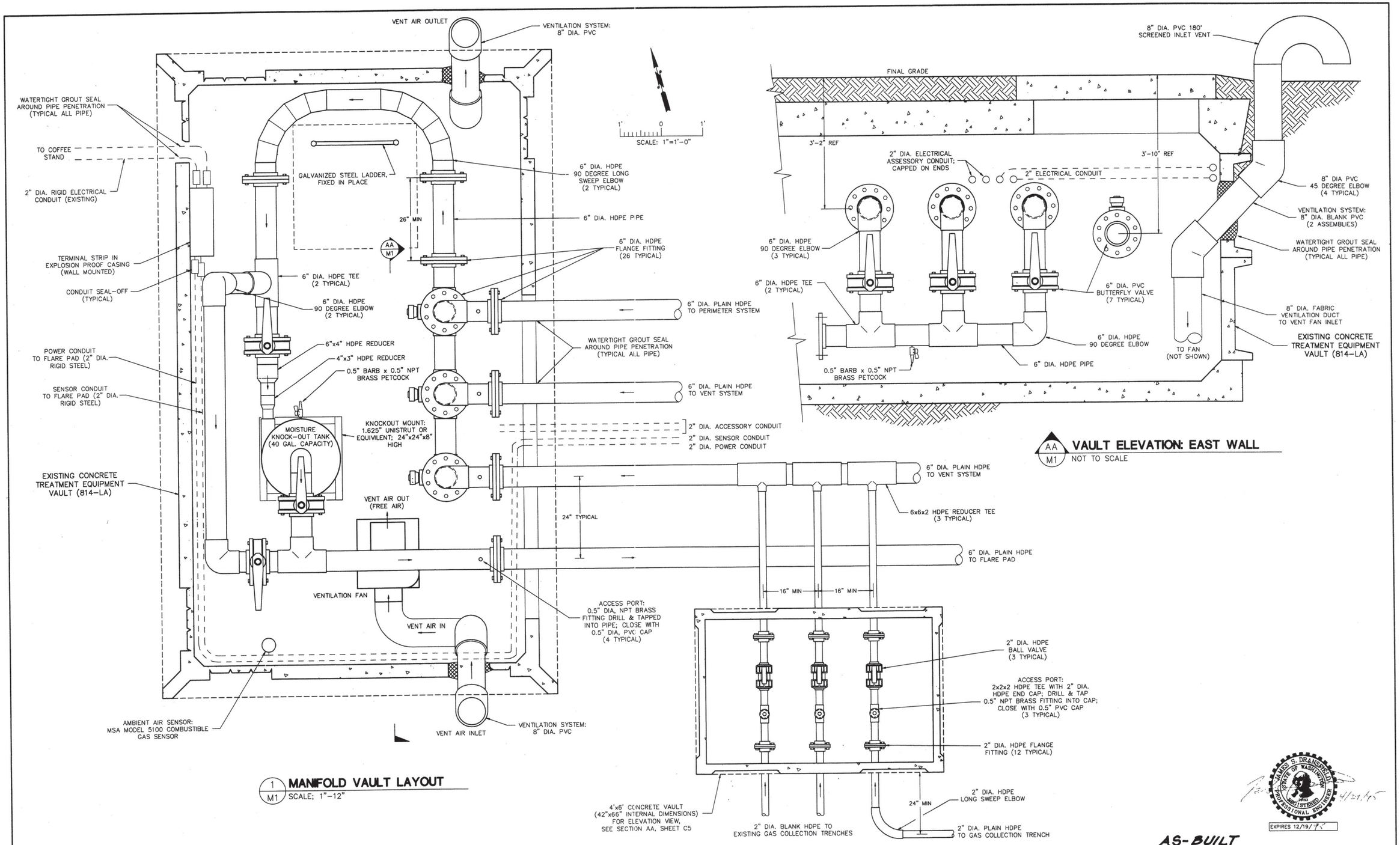
MANIFOLD VAULT LAYOUT

SURVEY NO.

SHEET
M1
REV 1

finaled 12/17/96

544.3321



1 / M1 **MANIFOLD VAULT LAYOUT**
SCALE; 1"-12"

AA / M1 **VAULT ELEVATION: EAST WALL**
NOT TO SCALE

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 20531 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12/19/97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\M1.DWG

PLAN CHECK	BY	DATE	DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		9 OF 10
DESIGNED BY: MARTIN FOX		DRAWN BY: MARTIN FOX	
DATE APPROVED:		FIELD BOOK(S):	

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

MANIFOLD VAULT LAYOUT

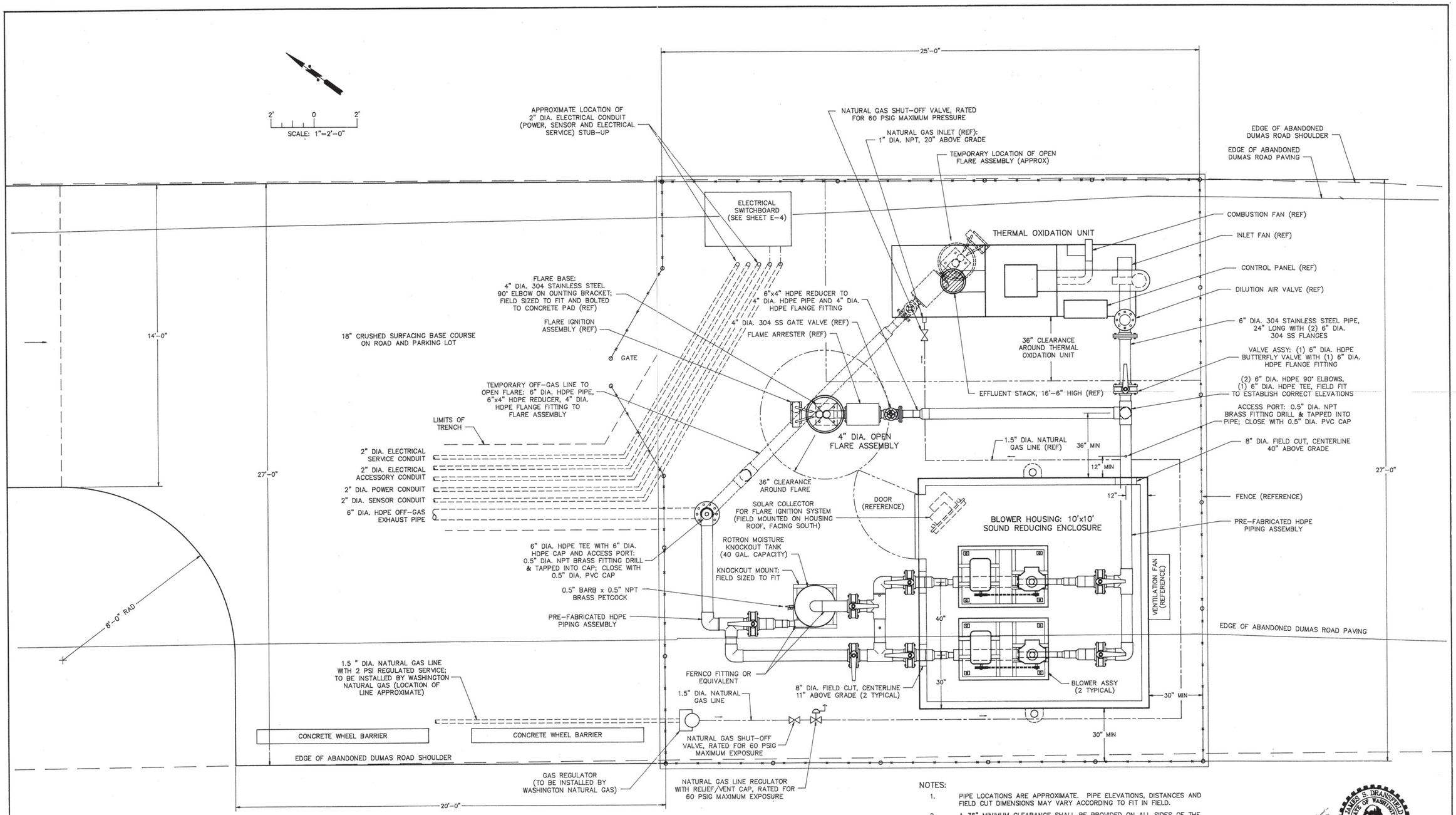
SURVEY NO.

SHEET M1

filmed 12/17/96

file: Survey 3321

DigiPrint™



1 / M2 FLARE PAD DETAIL

NOT TO SCALE

NOTES:

1. PIPE LOCATIONS ARE APPROXIMATE. PIPE ELEVATIONS, DISTANCES AND FIELD CUT DIMENSIONS MAY VARY ACCORDING TO FIT IN FIELD.
2. A 36" MINIMUM CLEARANCE SHALL BE PROVIDED ON ALL SIDES OF THE THERMAL OXIDATION UNIT. NATURAL GAS VENT LINES, OFF GAS ACCESS PORTS, BLEED VALVE EFFLUENTS, SLATTED FENCE BOARDS, AND OTHER POTENTIALLY FLAMMABLE MATERIALS SHALL BE LOCATED OUTSIDE OF THIS CLEARANCE.
3. THE BLOWER HOUSING SHALL BE LOCATED A MINUMUM DISTANCE OF 30" FROM THE FENCE.
4. REFER TO "SWITCHBOARD DETAIL", SHEET E-4 FOR CONCRETE SLAB INFORMATION AND DIMENSIONS.

JAMES S. DRANSFIELD STATE OF WASHINGTON 20480 REGISTERED PROFESSIONAL ENGINEER
8/2/95
EXPIRES 12/19/95

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\M2-R1.DWG

PLAN CHECK	BY	DATE					
			7/10/95	1	EXPANDED SLAB, RECONFIGURED EQUIP		MJF
			DATE	NO.	REVISION		BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		10 OF 10

DESIGNED BY: MARTIN FOX
DRAWN BY: MARTIN FOX
DATE APPROVED:
FIELD BOOK(S):

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

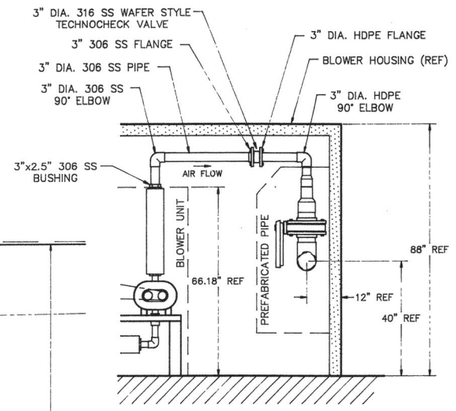
FLARE PAD LAYOUT

SURVEY NO.

SHEET
M2
REV 1

filed 12/17/96

Sheet 33 of



AA/M2 **BLOWER EXIT PIPING SECTION**
NOT TO SCALE

1/M2 **FLARE PAD DETAIL**
NOT TO SCALE

NOTES:

1. PIPE LOCATIONS ARE APPROXIMATE. PIPE ELEVATIONS, DISTANCES AND FIELD CUT DIMENSIONS MAY VARY ACCORDING TO FIT IN FIELD.
2. A 36" MINIMUM CLEARANCE SHALL BE PROVIDED ON ALL SIDES OF THE THERMAL OXIDATION UNIT. NATURAL GAS VENT LINES, OFF GAS ACCESS PORTS, BLEED VALVE EFFLUENTS, SLATTED FENCE BOARDS, AND OTHER POTENTIALLY FLAMMABLE MATERIALS SHALL BE LOCATED OUTSIDE OF THIS CLEARANCE.
3. THE BLOWER HOUSING SHALL BE LOCATED A MINUMUM DISTANCE OF 30" FROM THE FENCE.
4. REFER TO "SWITCHBOARD DETAIL", SHEET E-4 FOR CONCRETE SLAB INFORMATION AND DIMENSIONS.

JAMES S. DRANSFIELD STATE OF WASHINGTON 13963 REGISTERED PROFESSIONAL ENGINEER 9/2/96
EXPIRES 12/19/ 97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07784-04\M2-R2.DWG

PLAN CHECK	BY	DATE					
			8/18/95	2	ADDED (2) BLOWER CHECK VALVES	MJF	
			7/10/95	1	EXPANDED SLAB, RECONFIGURED EQUIP	MJF	
			DATE	NO.	REVISION	BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		10 OF 10

DESIGNED BY: MARTIN FOX | DRAWN BY: MARTIN FOX
DATE APPROVED: | FIELD BOOK(S):

AGRA *Earth & Environmental*
11335 N.E. 122rid Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS
PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

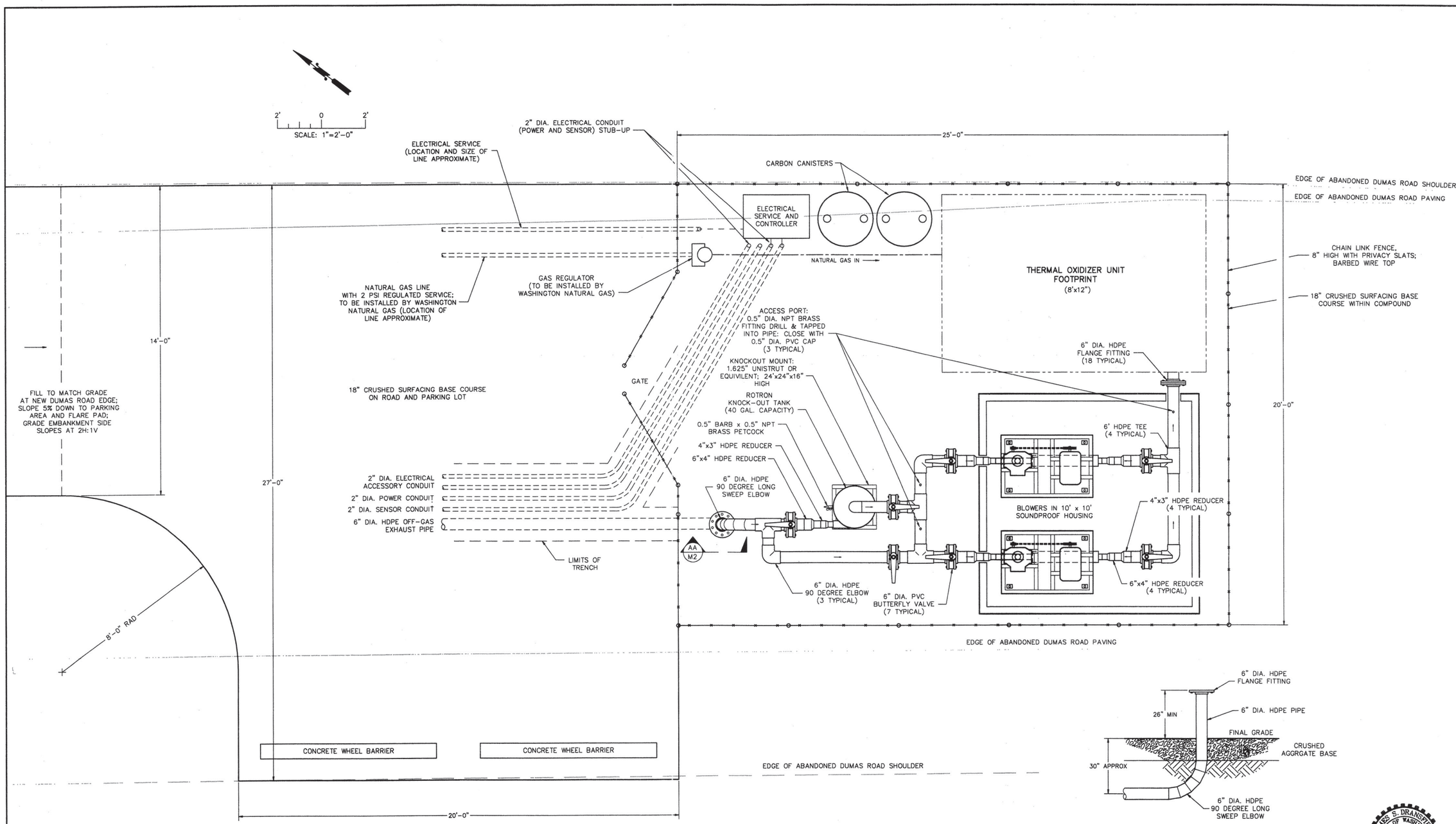
FLARE PAD LAYOUT

SURVEY NO.

SHEET **M2** REV 2

filmed 12/17/96

Sur. 3321



1 / M2 **FLARE PAD DETAIL**
NOT TO SCALE

AA / M2 **STUB-UP DETAIL**
NOT TO SCALE

JAMES S. DRANGSFELD — STATE OF WASHINGTON — 1975 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12/19/97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\M2.DWG

PLAN CHECK	BY	DATE					
			DATE	NO.	REVISION		BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		10 OF 10
DESIGNED BY: MARTIN FOX		DRAWN BY: MARTIN FOX	
DATE APPROVED:		FIELD BOOK(S):	

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS
PROJECT NO. _____

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

FLARE PAD LAYOUT

SURVEY NO.

SHEET
M2

filmed 12/17/96

Sur 8321

DigiPrint™

LEGEND

(FP) FLARE PAD
(BH) BLOWER HOUSING
(MV) MANIFOLD VAULT
(CS) COFFEE STAND

INCOMING POWER: P1A, P1B, P1C, N

FLARE PAD SWITCHBOARD

PANEL S
277/480 VOLTS
3 PHASE

INCOMING POWER	INCOMING POWER	INCOMING POWER	NEUTRAL	CONTROLLER POWER	CONTROLLER POWER	CONTROLLER POWER	NEUTRAL	THERMAL OXIDATION UNIT	THERMAL OXIDATION UNIT	THERMAL OXIDATION UNIT	NEUTRAL
P1A	P1B	P1C	N	P2A	P2B	P2C	N	TA	TB	TC	N

THERM-OX POWER

THERMAL OXIDIZER

N	TC	TB	TA			19	31

BLOWER HOUSING

BLOWER No. 1				BLOWER No. 2				VENT FAN No. 2				MSA SENSOR		
B1A	B1B	B1C	N	B2A	B2B	B2C	N	V2A	V2B	V2C	N	B1	B2	S

BLOWER HOUSING POWER

BLOWER HOUSING CONTROL

MANIFOLD VAULT POWER

THERM-OX CONTROL

CONTROLLER

CONTROLLER POWER	P2A
CONTROLLER POWER	P2B
CONTROLLER POWER	P2C
277/480V NEUTRAL	N
BLOWER #1	B1A
BLOWER #1	B1B
BLOWER #1	B1C
277/480V NEUTRAL	N
BLOWER #2	B2A
BLOWER #2	B2B
BLOWER #2	B2C
277/480V NEUTRAL	N
VENT FAN (BH)	V2A
VENT FAN (BH)	V2B
VENT FAN (BH)	V2C
277/480V NEUTRAL	N
VENT FAN (MV)	V1A
VENT FAN (MV)	V1B
VENT FAN (MV)	V1C
277/480V NEUTRAL	N
MSA CONTROL POWER	1
THERMAL OXIDATION UNIT ALARM	19
EMERGENCY STOP (MV)	19
EMERGENCY STOP (FP)	19
MSA CONTACT #1 (MV) "WARNING"	19
MSA CONTACT #1 (BH) "WARNING"	19
MSA CONTACT #2 (MV) "ALARM"	19
MSA CONTACT #2 (BH) "ALARM"	19
MSA CONTACT #1 (MV) "WARNING"	20
MSA CONTACT #1 (BH) "WARNING"	21
MSA CONTACT #2 (MV) "ALARM"	24
MSA CONTACT #2 (BH) "ALARM"	25
EMERGENCY STOP (FP)	26
EMERGENCY STOP (MV)	26
THERMAL OXIDATION UNIT ALARM	31
RED INDICATOR LIGHT (CS)	32
RED INDICATOR LIGHT (MV)	32
ALARM HORN (OPTIONAL)	33
GREEN INDICATOR LIGHT (CS)	35
GREEN INDICATOR LIGHT (MV)	35
K/O TANK FLOAT SWITCH (MV)	60
K/O TANK FLOAT SWITCH (MV)	61
K/O TANK FLOAT SWITCH (FP)	62
K/O TANK FLOAT SWITCH (FP)	63
RED/GREEN INDICATOR LIGHT (CS)	N
RED/GREEN INDICATOR LIGHT (MV)	N
ALARM HORN (OPTIONAL)	N
MSA CONTROL POWER	N
TELEMETRY UNIT	T1
TELEMETRY UNIT	T2
TELEMETRY UNIT	T3
TELEMETRY UNIT	T4

TO MSA CONTROL

120V NEUTRAL

TO CONTROLLER

MSA SENSOR CONTROL

1	N		21	19		25	19		20	19		24	19		B1	B2	S		A1	A2	S
			CHANNEL B (BH)						CHANNEL A (MV)												

19	26

EMERGENCY STOP

KNOCKOUT TANK CONTROL

62	63

KNOCKOUT TANK

MANIFOLD VAULT CONTROL

MANIFOLD VAULT

V1A	V1B	V1C	N

VENT FAN No. 1

A1	A2	S

MSA SENSOR

19	26

EMERGENCY STOP

32	35	N

INDICATOR LIGHT BANK

60	61

KNOCKOUT TANK

COFFEE STAND

32	35	N

INDICATOR LIGHT BANK

TELEPHONE LINE

INCOMING TELEPHONE

JAMES S. DRANSFIELD — STATE OF WASHINGTON — 10/17/95 — REGISTERED PROFESSIONAL ENGINEER — EXPIRES 12/19/97

AS-BUILT

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING No. \PLAN-SET\11\07764-04\M3.DWG

PLAN CHECK	BY	DATE						
			DATE	NO.	REVISION		BY	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO
10	WASH.		
DESIGNED BY: MARTIN FOX		DRAWN BY: MARTIN FOX	
DATE APPROVED:		FIELD BOOK(S):	

AGRA
Earth & Environmental
11335 N.E. 122nd Way, Suite 100
Kirkland, Washington, U.S.A. 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. 11-07764-04

128th ST. S.E. / DUMAS ROAD
LANDFILL GAS MANAGEMENT SYSTEM

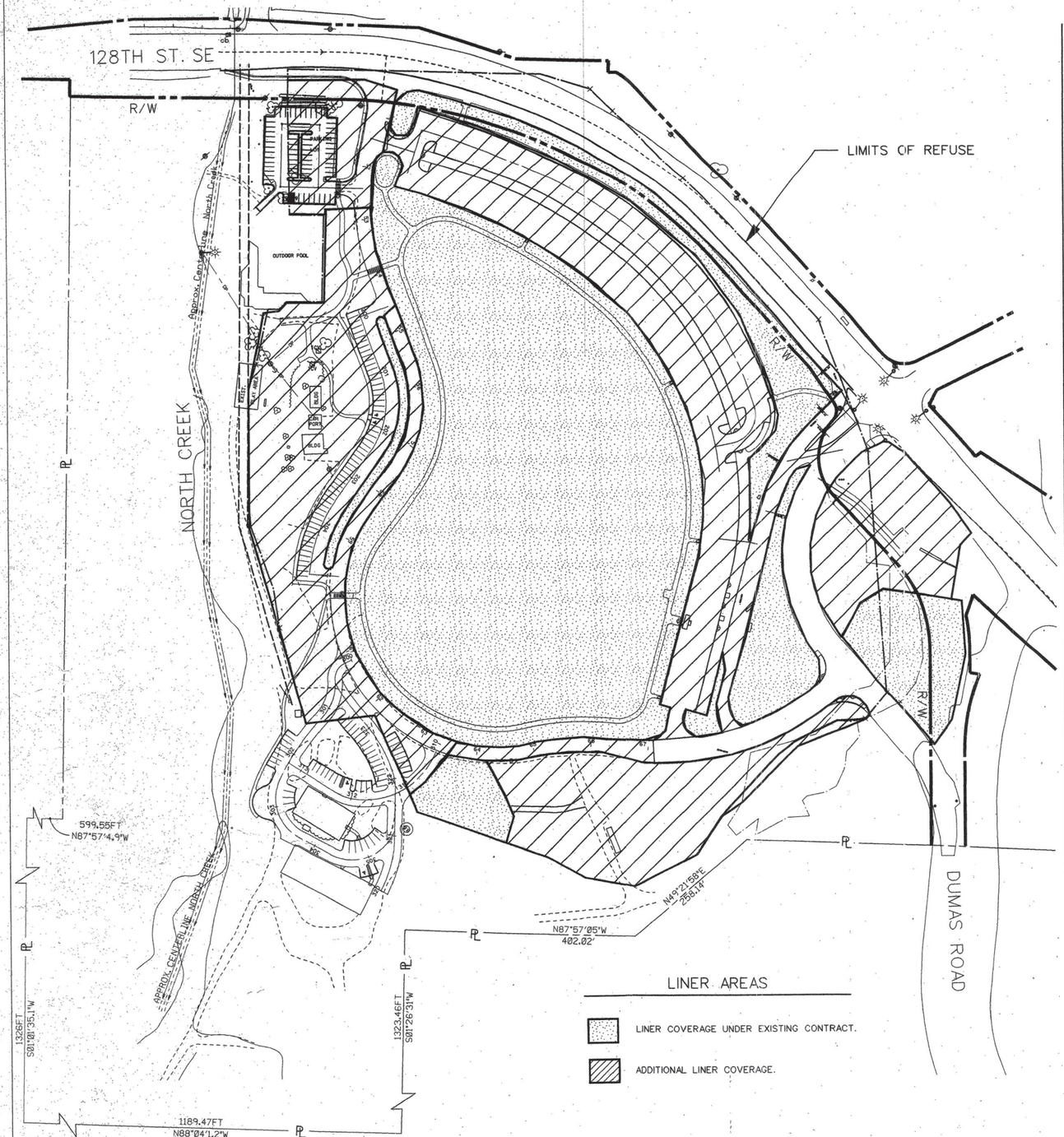
LANDFILL GAS SYSTEM CONTROL DIAGRAM

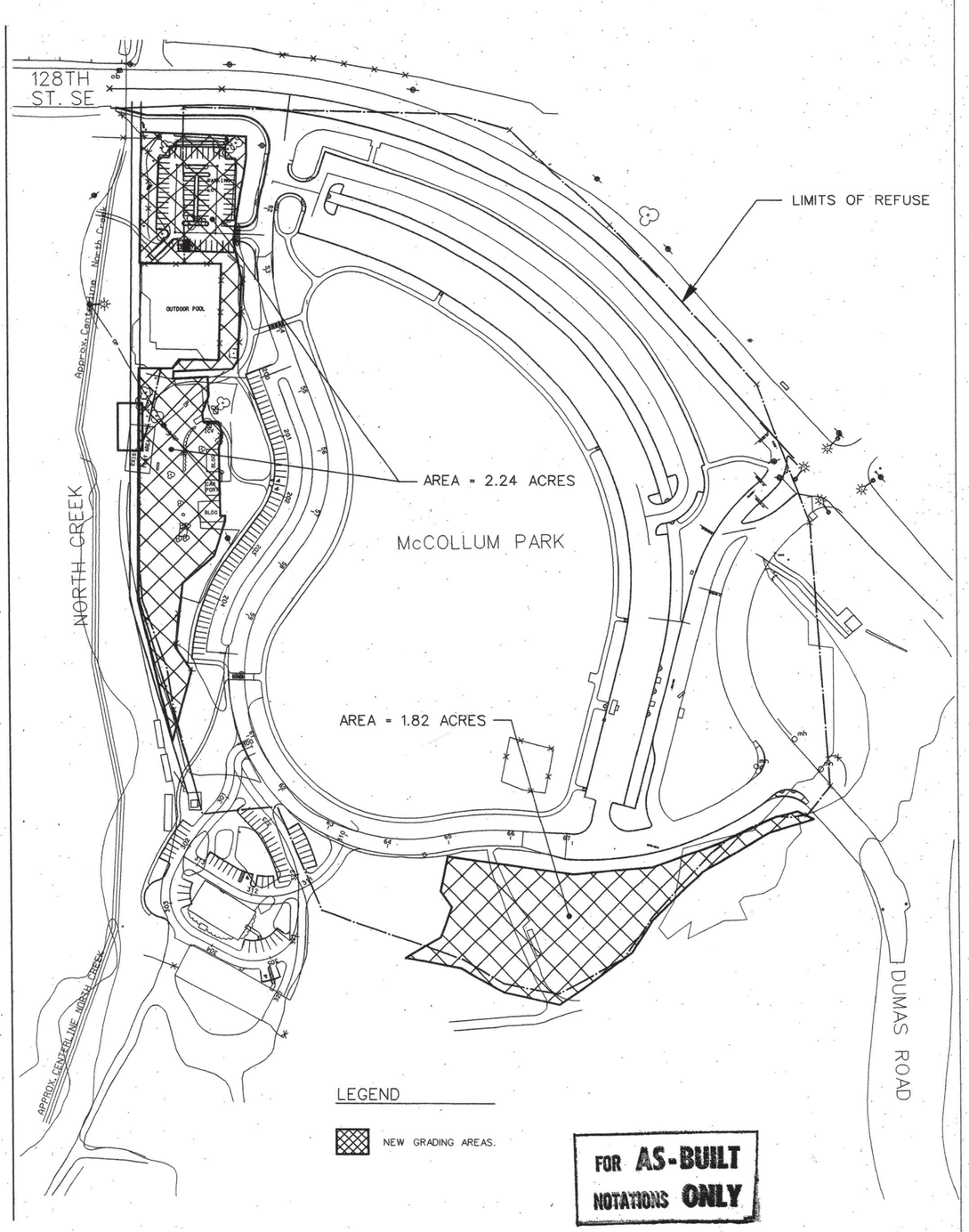
SURVEY NO.

SHEET M3

filmed 12/17/96

SUR. 3321





PLAN CHECK	BY	DATE	DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
10	WASH.		
DESIGNED BY:		DRAWN BY:	
DATE APPROVED:		FIELD BOOK(S):	

RICHARD L. PERLEY STATE OF WASHINGTON 12040 REGISTERED PROFESSIONAL ENGINEER
EXPIRE 9/30/96

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO.

McCOLLUM PARK REGRADE

LINER & GRADING AREA PLAN

SURVEY NO.

SHEET 3 OF 12 SHEETS

SEC 30, T28N, R5E, W.M.

SCALE IN FEET 0 50 100 150

CONSTRUCTION NOTES

1. PLAY AREA EQUIPMENT TO BE REMOVED AND RESET AS DIRECTED IN THE FIELD.
2. BENCH TO BE REMOVED AND RESET AS DIRECTED IN THE FIELD.
3. BUILDING TO BE DEMOLISHED
4. BIOFILTRATION TRENCH PER DETAIL SHEET 12.
5. IRRIGATION CONTROL VALVES TO BE REMOVED.
6. UTILITY POLE TO BE RELOCATED BY OTHERS.
7. ACCESS ROAD AND PAD PER DETAIL SHEET 12.
8. NATIVE GROWTH PROTECTION AREA SIGN PER DETAIL SHEET 11.
9. CONSTRUCT LINER BOOT PER DETAIL 1, SHEET C18 OF ORIGINAL PLAN SET.
10. CONSTRUCT LINER BOOT PER DETAIL SHEET 12.
11. CONSTRUCT LINER BOOT PER DETAIL 3, SHEET C18 OF ORIGINAL PLAN SET.
12. EXISTING OVERHEAD TELEPHONE SERVICE TO BE ABANDONED AND NEW UNDERGROUND SERVICE TO BE PROVIDED BY OTHERS. NEW SERVICE TO BE ROUTED TO THE POOL OFFICE & WSU EXSTENSION SERVICE BUILDING WITHIN THE EXISTING UTILITY EASEMENT.
13. New Waterlake Vault & Lid

FOR AS-BUILT NOTATIONS ONLY

LIMITS OF REFUSE

PARKING LOT

OUTDOOR POOL

128th ST. SE

Approx. Centerline North Creek

NGPA BUFFER LINE

PARK ROAD

DUMAS ROAD

F.G.=402.75

GRADE BREAK

TYPICAL EACH LUMINAIRE

TYPICAL EACH FOOTING

EAST DISPOSAL AREA

MATCH LINE - STA 60+00 (PARK ROAD)

PLAN CHECK	BY	DATE	DATE	NO.	REVISION	BY

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
10	WASH.		

DESIGNED BY: DRAWN BY:

DATE APPROVED: FIELD, BOOK(S):

RICHARD L. PERFETTI — STATE OF WASHINGTON — 12040 — REGISTERED PROFESSIONAL ENGINEER — EXPIRE 9/30/96 — 4-25-95

SNOHOMISH COUNTY ENGINEER

SNOHOMISH COUNTY DEPARTMENT OF PUBLIC WORKS

PROJECT NO. _____

McCOLLUM PARK REGRADE

REVISED GRADING PLAN (NORTH)

SURVEY NO.

SHEET 4 OF 12 SHEETS

Attachment B

Site Photographs

Gas Probe GP-14

Gas Probe GP-15

Gas Probe GP-16

Gas Probe GP-18

Gas Probe GP-19

Monitoring Well BH-03

Monitoring Well BH-07

Monitoring Well BH-08

Vacuum system main underground manifold near bus station

Typical subsurface manifold sampling ports on LFG control system

Flare Facility sampling port (lower right)

Flare location

Flare facility overview

Summa canister sampling at the Flare sample port.

Attachment C

Laboratory Analytical Results

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 13, 2021

Mike Brady, Project Manager
Parametrix
719 2nd Ave, Suite 200
Seattle, WA 98104

Dear Mr Brady:

Included are the results from the testing of material submitted on April 28, 2021 from the Snoho Co - McCollum Park and Emander Landfill 373-1513-112, F&BI 104514 project. There are 13 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PMX0513R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 28, 2021 by Friedman & Bruya, Inc. from the Parametrix Snoho Co - McCollum Park and Emander Landfill 373-1513-112, F&BI 104514 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Parametrix
104514 -01	GP-14
104514 -02	GP-15
104514 -03	GP-19
104514 -04	GP-18
104514 -05	BH-07
104514 -06	Flare

The concentration of ethanol exceeded the calibration range of the instrument in samples GP-14, GP-15, and BH-07. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	GP-14	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-01 1/5.5
Date Analyzed:	05/07/21	Data File:	050624.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<6.6	<3.8	1,2-Dichloropropane	<1.3	<0.28
Dichlorodifluoromethane	4.1	0.84	1,4-Dioxane	<2	<0.55
Chloromethane	<20	<9.9	2,2,4-Trimethylpentane	<26	<5.5
F-114	49	7.0	Methyl methacrylate	<23	<5.5
Vinyl chloride	<1.4	<0.55	Heptane	<23	<5.5
1,3-Butadiene	<0.24	<0.11	Bromodichloromethane	<0.37	<0.055
Butane	<26	<11	Trichloroethene	<0.59	<0.11
Bromomethane	<13	<3.3	cis-1,3-Dichloropropene	<2.5	<0.55
Chloroethane	<15	<5.5	4-Methyl-2-pentanone	<23	<5.5
Vinyl bromide	<2.4	<0.55	trans-1,3-Dichloropropene	<2.5	<0.55
Ethanol	310 ve	160 ve	Toluene	<100	<27
Acrolein	0.73	0.32	1,1,2-Trichloroethane	<0.3	<0.055
Pentane	<16	<5.5	2-Hexanone	<23	<5.5
Trichlorofluoromethane	<12	<2.2	Tetrachloroethene	<37	<5.5
Acetone	44	18	Dibromochloromethane	<0.47	<0.055
2-Propanol	<47	<19	1,2-Dibromoethane (EDB)	<0.42	<0.055
1,1-Dichloroethene	<2.2	<0.55	Chlorobenzene	<2.5	<0.55
trans-1,2-Dichloroethene	<2.2	<0.55	Ethylbenzene	7.6	1.8
Methylene chloride	<190	<55	1,1,2,2-Tetrachloroethane	<0.76	<0.11
t-Butyl alcohol (TBA)	<67	<22	Nonane	<29	<5.5
3-Chloropropene	<8.6	<2.7	Isopropylbenzene	<14	<2.7
CFC-113	<4.2	<0.55	2-Chlorotoluene	<28	<5.5
Carbon disulfide	<34	<11	Propylbenzene	<14	<2.7
Methyl t-butyl ether (MTBE)	<9.9	<2.7	4-Ethyltoluene	<14	<2.7
Vinyl acetate	<39	<11	m,p-Xylene	35	8.1
1,1-Dichloroethane	<2.2	<0.55	o-Xylene	14	3.2
cis-1,2-Dichloroethene	<2.2	<0.55	Styrene	<4.7	<1.1
Hexane	<19	<5.5	Bromoform	<11	<1.1
Chloroform	0.40	0.082	Benzyl chloride	<0.28	<0.055
Ethyl acetate	<40	<11	1,3,5-Trimethylbenzene	<14	<2.7
Tetrahydrofuran	<1.7	<0.55	1,2,4-Trimethylbenzene	<14	<2.7
2-Butanone (MEK)	<16	<5.5	1,3-Dichlorobenzene	<3.3	<0.55
1,2-Dichloroethane (EDC)	<0.22	<0.055	1,4-Dichlorobenzene	<1.3	<0.21
1,1,1-Trichloroethane	<3	<0.55	1,2-Dichlorobenzene	<3.3	<0.55
Carbon tetrachloride	<1.7	<0.28	1,2,4-Trichlorobenzene	<4.1	<0.55
Benzene	<1.8	<0.55	Naphthalene	<1.4	<0.28
Cyclohexane	<38	<11	Hexachlorobutadiene	<1.2	<0.11

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	GP-15	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-02 1/6
Date Analyzed:	05/07/21	Data File:	050625.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<7.2	<4.2	1,2-Dichloropropane	<1.4	<0.3
Dichlorodifluoromethane	3.1	0.63	1,4-Dioxane	<2.2	<0.6
Chloromethane	<22	<11	2,2,4-Trimethylpentane	<28	<6
F-114	<4.2	<0.6	Methyl methacrylate	<25	<6
Vinyl chloride	<1.5	<0.6	Heptane	<25	<6
1,3-Butadiene	<0.27	<0.12	Bromodichloromethane	<0.4	<0.06
Butane	<29	<12	Trichloroethene	<0.64	<0.12
Bromomethane	<14	<3.6	cis-1,3-Dichloropropene	<2.7	<0.6
Chloroethane	<16	<6	4-Methyl-2-pentanone	<25	<6
Vinyl bromide	<2.6	<0.6	trans-1,3-Dichloropropene	<2.7	<0.6
Ethanol	190 ve	100 ve	Toluene	<110	<30
Acrolein	0.89	0.39	1,1,2-Trichloroethane	<0.33	<0.06
Pentane	<18	<6	2-Hexanone	<25	<6
Trichlorofluoromethane	<13	<2.4	Tetrachloroethene	<41	<6
Acetone	49	21	Dibromochloromethane	<0.51	<0.06
2-Propanol	<52	<21	1,2-Dibromoethane (EDB)	<0.46	<0.06
1,1-Dichloroethene	<2.4	<0.6	Chlorobenzene	<2.8	<0.6
trans-1,2-Dichloroethene	<2.4	<0.6	Ethylbenzene	5.9	1.4
Methylene chloride	<210	<60	1,1,2,2-Tetrachloroethane	<0.82	<0.12
t-Butyl alcohol (TBA)	<73	<24	Nonane	<31	<6
3-Chloropropene	<9.4	<3	Isopropylbenzene	<15	<3
CFC-113	<4.6	<0.6	2-Chlorotoluene	<31	<6
Carbon disulfide	<37	<12	Propylbenzene	<15	<3
Methyl t-butyl ether (MTBE)	<11	<3	4-Ethyltoluene	<15	<3
Vinyl acetate	<42	<12	m,p-Xylene	25	5.7
1,1-Dichloroethane	<2.4	<0.6	o-Xylene	8.7	2.0
cis-1,2-Dichloroethene	<2.4	<0.6	Styrene	<5.1	<1.2
Hexane	<21	<6	Bromoform	<12	<1.2
Chloroform	1.2	0.25	Benzyl chloride	<0.31	<0.06
Ethyl acetate	<43	<12	1,3,5-Trimethylbenzene	<15	<3
Tetrahydrofuran	11	3.7	1,2,4-Trimethylbenzene	<15	<3
2-Butanone (MEK)	<18	<6	1,3-Dichlorobenzene	<3.6	<0.6
1,2-Dichloroethane (EDC)	<0.24	<0.06	1,4-Dichlorobenzene	<1.4	<0.23
1,1,1-Trichloroethane	<3.3	<0.6	1,2-Dichlorobenzene	<3.6	<0.6
Carbon tetrachloride	<1.9	<0.3	1,2,4-Trichlorobenzene	<4.5	<0.6
Benzene	<1.9	<0.6	Naphthalene	<1.6	<0.3
Cyclohexane	<41	<12	Hexachlorobutadiene	<1.3	<0.12

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	GP-19	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-03 1/5.8
Date Analyzed:	05/07/21	Data File:	050626.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<7	<4.1	1,2-Dichloropropane	<1.3	<0.29
Dichlorodifluoromethane	2.9	0.59	1,4-Dioxane	<2.1	<0.58
Chloromethane	<22	<10	2,2,4-Trimethylpentane	<27	<5.8
F-114	<4.1	<0.58	Methyl methacrylate	<24	<5.8
Vinyl chloride	<1.5	<0.58	Heptane	<24	<5.8
1,3-Butadiene	<0.26	<0.12	Bromodichloromethane	<0.39	<0.058
Butane	<28	<12	Trichloroethene	<0.62	<0.12
Bromomethane	<14	<3.5	cis-1,3-Dichloropropene	<2.6	<0.58
Chloroethane	<15	<5.8	4-Methyl-2-pentanone	<24	<5.8
Vinyl bromide	<2.5	<0.58	trans-1,3-Dichloropropene	<2.6	<0.58
Ethanol	62	33	Toluene	<110	<29
Acrolein	1.1	0.49	1,1,2-Trichloroethane	<0.32	<0.058
Pentane	<17	<5.8	2-Hexanone	<24	<5.8
Trichlorofluoromethane	<13	<2.3	Tetrachloroethene	<39	<5.8
Acetone	37	16	Dibromochloromethane	<0.49	<0.058
2-Propanol	<50	<20	1,2-Dibromoethane (EDB)	<0.45	<0.058
1,1-Dichloroethene	<2.3	<0.58	Chlorobenzene	<2.7	<0.58
trans-1,2-Dichloroethene	<2.3	<0.58	Ethylbenzene	4.4	1.0
Methylene chloride	<200	<58	1,1,2,2-Tetrachloroethane	<0.8	<0.12
t-Butyl alcohol (TBA)	<70	<23	Nonane	<30	<5.8
3-Chloropropene	<9.1	<2.9	Isopropylbenzene	<14	<2.9
CFC-113	<4.4	<0.58	2-Chlorotoluene	<30	<5.8
Carbon disulfide	<36	<12	Propylbenzene	<14	<2.9
Methyl t-butyl ether (MTBE)	<10	<2.9	4-Ethyltoluene	<14	<2.9
Vinyl acetate	<41	<12	m,p-Xylene	18	4.0
1,1-Dichloroethane	<2.3	<0.58	o-Xylene	6.4	1.5
cis-1,2-Dichloroethene	<2.3	<0.58	Styrene	<4.9	<1.2
Hexane	<20	<5.8	Bromoform	<12	<1.2
Chloroform	1.1	0.23	Benzyl chloride	<0.3	<0.058
Ethyl acetate	<42	<12	1,3,5-Trimethylbenzene	<14	<2.9
Tetrahydrofuran	<1.8	<0.58	1,2,4-Trimethylbenzene	<14	<2.9
2-Butanone (MEK)	<17	<5.8	1,3-Dichlorobenzene	<3.5	<0.58
1,2-Dichloroethane (EDC)	<0.23	<0.058	1,4-Dichlorobenzene	<1.4	<0.22
1,1,1-Trichloroethane	<3.2	<0.58	1,2-Dichlorobenzene	<3.5	<0.58
Carbon tetrachloride	<1.8	<0.29	1,2,4-Trichlorobenzene	<4.3	<0.58
Benzene	<1.9	<0.58	Naphthalene	<1.5	<0.29
Cyclohexane	<40	<12	Hexachlorobutadiene	<1.2	<0.12

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	GP-18	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-04 1/5.9
Date Analyzed:	05/07/21	Data File:	050627.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<7.1	<4.1	1,2-Dichloropropane	<1.4	<0.29
Dichlorodifluoromethane	2.9	0.60	1,4-Dioxane	<2.1	<0.59
Chloromethane	<22	<11	2,2,4-Trimethylpentane	<28	<5.9
F-114	<4.1	<0.59	Methyl methacrylate	<24	<5.9
Vinyl chloride	<1.5	<0.59	Heptane	<24	<5.9
1,3-Butadiene	<0.26	<0.12	Bromodichloromethane	<0.4	<0.059
Butane	<28	<12	Trichloroethene	<0.63	<0.12
Bromomethane	<14	<3.5	cis-1,3-Dichloropropene	<2.7	<0.59
Chloroethane	<16	<5.9	4-Methyl-2-pentanone	<24	<5.9
Vinyl bromide	<2.6	<0.59	trans-1,3-Dichloropropene	<2.7	<0.59
Ethanol	66	35	Toluene	<110	<29
Acrolein	1.2	0.51	1,1,2-Trichloroethane	<0.32	<0.059
Pentane	<17	<5.9	2-Hexanone	<24	<5.9
Trichlorofluoromethane	<13	<2.4	Tetrachloroethene	<40	<5.9
Acetone	<28	<12	Dibromochloromethane	<0.5	<0.059
2-Propanol	<51	<21	1,2-Dibromoethane (EDB)	<0.45	<0.059
1,1-Dichloroethene	<2.3	<0.59	Chlorobenzene	<2.7	<0.59
trans-1,2-Dichloroethene	<2.3	<0.59	Ethylbenzene	4.1	0.95
Methylene chloride	<200	<59	1,1,2,2-Tetrachloroethane	<0.81	<0.12
t-Butyl alcohol (TBA)	<72	<24	Nonane	<31	<5.9
3-Chloropropene	<9.2	<2.9	Isopropylbenzene	<15	<2.9
CFC-113	<4.5	<0.59	2-Chlorotoluene	<31	<5.9
Carbon disulfide	<37	<12	Propylbenzene	<15	<2.9
Methyl t-butyl ether (MTBE)	<11	<2.9	4-Ethyltoluene	<15	<2.9
Vinyl acetate	<42	<12	m,p-Xylene	19	4.3
1,1-Dichloroethane	<2.4	<0.59	o-Xylene	8.0	1.8
cis-1,2-Dichloroethene	<2.3	<0.59	Styrene	<5	<1.2
Hexane	<21	<5.9	Bromoform	<12	<1.2
Chloroform	2.6	0.53	Benzyl chloride	<0.31	<0.059
Ethyl acetate	<43	<12	1,3,5-Trimethylbenzene	<15	<2.9
Tetrahydrofuran	<1.8	<0.59	1,2,4-Trimethylbenzene	<15	<2.9
2-Butanone (MEK)	<17	<5.9	1,3-Dichlorobenzene	<3.5	<0.59
1,2-Dichloroethane (EDC)	<0.24	<0.059	1,4-Dichlorobenzene	<1.4	<0.22
1,1,1-Trichloroethane	<3.2	<0.59	1,2-Dichlorobenzene	<3.5	<0.59
Carbon tetrachloride	<1.9	<0.29	1,2,4-Trichlorobenzene	<4.4	<0.59
Benzene	<1.9	<0.59	Naphthalene	<1.5	<0.29
Cyclohexane	<41	<12	Hexachlorobutadiene	<1.3	<0.12

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	BH-07	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-05 1/5.7
Date Analyzed:	05/07/21	Data File:	050628.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<6.9	<4	1,2-Dichloropropane	<1.3	<0.28
Dichlorodifluoromethane	3.2	0.64	1,4-Dioxane	<2.1	<0.57
Chloromethane	<21	<10	2,2,4-Trimethylpentane	<27	<5.7
F-114	<4	<0.57	Methyl methacrylate	<23	<5.7
Vinyl chloride	<1.5	<0.57	Heptane	<23	<5.7
1,3-Butadiene	<0.25	<0.11	Bromodichloromethane	<0.38	<0.057
Butane	<27	<11	Trichloroethene	<0.61	<0.11
Bromomethane	<13	<3.4	cis-1,3-Dichloropropene	<2.6	<0.57
Chloroethane	<15	<5.7	4-Methyl-2-pentanone	<23	<5.7
Vinyl bromide	<2.5	<0.57	trans-1,3-Dichloropropene	<2.6	<0.57
Ethanol	180 ve	93 ve	Toluene	<110	<28
Acrolein	2.5	1.1	1,1,2-Trichloroethane	<0.31	<0.057
Pentane	<17	<5.7	2-Hexanone	<23	<5.7
Trichlorofluoromethane	<13	<2.3	Tetrachloroethene	<39	<5.7
Acetone	<27	<11	Dibromochloromethane	<0.49	<0.057
2-Propanol	<49	<20	1,2-Dibromoethane (EDB)	<0.44	<0.057
1,1-Dichloroethene	<2.3	<0.57	Chlorobenzene	<2.6	<0.57
trans-1,2-Dichloroethene	<2.3	<0.57	Ethylbenzene	3.0	0.70
Methylene chloride	<200	<57	1,1,2,2-Tetrachloroethane	<0.78	<0.11
t-Butyl alcohol (TBA)	<69	<23	Nonane	<30	<5.7
3-Chloropropene	<8.9	<2.8	Isopropylbenzene	<14	<2.8
CFC-113	<4.4	<0.57	2-Chlorotoluene	<30	<5.7
Carbon disulfide	<36	<11	Propylbenzene	<14	<2.8
Methyl t-butyl ether (MTBE)	<10	<2.8	4-Ethyltoluene	<14	<2.8
Vinyl acetate	<40	<11	m,p-Xylene	14	3.1
1,1-Dichloroethane	<2.3	<0.57	o-Xylene	5.2	1.2
cis-1,2-Dichloroethene	<2.3	<0.57	Styrene	<4.9	<1.1
Hexane	<20	<5.7	Bromoform	<12	<1.1
Chloroform	<0.28	<0.057	Benzyl chloride	<0.3	<0.057
Ethyl acetate	<41	<11	1,3,5-Trimethylbenzene	<14	<2.8
Tetrahydrofuran	<1.8	<0.57	1,2,4-Trimethylbenzene	<14	<2.8
2-Butanone (MEK)	<17	<5.7	1,3-Dichlorobenzene	<3.4	<0.57
1,2-Dichloroethane (EDC)	<0.23	<0.057	1,4-Dichlorobenzene	<1.4	<0.22
1,1,1-Trichloroethane	<3.1	<0.57	1,2-Dichlorobenzene	<3.4	<0.57
Carbon tetrachloride	<1.8	<0.28	1,2,4-Trichlorobenzene	<4.2	<0.57
Benzene	<1.8	<0.57	Naphthalene	<1.5	<0.28
Cyclohexane	<39	<11	Hexachlorobutadiene	<1.2	<0.11

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Flare	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-06 1/98
Date Analyzed:	05/07/21	Data File:	050630.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	109	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<120	<69	1,2-Dichloropropane	<23	<4.9
Dichlorodifluoromethane	540	110	1,4-Dioxane	<35	<9.8
Chloromethane	<360	<180	2,2,4-Trimethylpentane	1,000	220
F-114	1,200	170	Methyl methacrylate	<400	<98
Vinyl chloride	110	42	Heptane	730	180
1,3-Butadiene	<4.3	<2	Bromodichloromethane	<6.6	<0.98
Butane	860	360	Trichloroethene	<11	<2
Bromomethane	<230	<59	cis-1,3-Dichloropropene	<44	<9.8
Chloroethane	<260	<98	4-Methyl-2-pentanone	<400	<98
Vinyl bromide	<43	<9.8	trans-1,3-Dichloropropene	<44	<9.8
Ethanol	<740	<390	Toluene	<1,800	<490
Acrolein	<11	<4.9	1,1,2-Trichloroethane	<5.3	<0.98
Pentane	690	230	2-Hexanone	<400	<98
Trichlorofluoromethane	<220	<39	Tetrachloroethene	<660	<98
Acetone	<470	<200	Dibromochloromethane	<8.3	<0.98
2-Propanol	<840	<340	1,2-Dibromoethane (EDB)	<7.5	<0.98
1,1-Dichloroethene	<39	<9.8	Chlorobenzene	290	64
trans-1,2-Dichloroethene	<39	<9.8	Ethylbenzene	280	65
Methylene chloride	<3,400	<980	1,1,2,2-Tetrachloroethane	<13	<2
t-Butyl alcohol (TBA)	<1,200	<390	Nonane	<510	<98
3-Chloropropene	<150	<49	Isopropylbenzene	<240	<49
CFC-113	<75	<9.8	2-Chlorotoluene	<510	<98
Carbon disulfide	<610	<200	Propylbenzene	<240	<49
Methyl t-butyl ether (MTBE)	<180	<49	4-Ethyltoluene	<240	<49
Vinyl acetate	<690	<200	m,p-Xylene	280	65
1,1-Dichloroethane	<40	<9.8	o-Xylene	64	15
cis-1,2-Dichloroethene	<39	<9.8	Styrene	<83	<20
Hexane	960	270	Bromoform	<200	<20
Chloroform	<4.8	<0.98	Benzyl chloride	<5.1	<0.98
Ethyl acetate	<710	<200	1,3,5-Trimethylbenzene	<240	<49
Tetrahydrofuran	<30	<9.8	1,2,4-Trimethylbenzene	440	90
2-Butanone (MEK)	<290	<98	1,3-Dichlorobenzene	<59	<9.8
1,2-Dichloroethane (EDC)	<4	<0.98	1,4-Dichlorobenzene	210	35
1,1,1-Trichloroethane	<53	<9.8	1,2-Dichlorobenzene	<59	<9.8
Carbon tetrachloride	<31	<4.9	1,2,4-Trichlorobenzene	<73	<9.8
Benzene	160	50	Naphthalene	<26	<4.9
Cyclohexane	800	230	Hexachlorobutadiene	<21	<2

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Parametrix
Date Received:	Not Applicable	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	Not Applicable	Lab ID:	01-1057 MB2
Date Analyzed:	05/06/21	Data File:	050615.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	<0.49	<0.1	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	<0.11	<0.05	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	<0.049	<0.01	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	<0.31	<0.05	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.26	<0.05
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104571-02 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Propene	ug/m3	<6.6	<6.6	nm
Dichlorodifluoromethane	ug/m3	2.8	<2.7	nm
Chloromethane	ug/m3	<20	<20	nm
F-114	ug/m3	<3.8	<3.8	nm
Vinyl chloride	ug/m3	<1.4	<1.4	nm
1,3-Butadiene	ug/m3	2.1	2.2	5
Butane	ug/m3	84	86	2
Bromomethane	ug/m3	<13	<13	nm
Chloroethane	ug/m3	<15	<15	nm
Vinyl bromide	ug/m3	<2.4	<2.4	nm
Ethanol	ug/m3	710	900	24
Acrolein	ug/m3	0.95	0.86	10
Pentane	ug/m3	54	52	4
Trichlorofluoromethane	ug/m3	<12	<12	nm
Acetone	ug/m3	250	240	4
2-Propanol	ug/m3	<47	<47	nm
1,1-Dichloroethene	ug/m3	<2.2	<2.2	nm
trans-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Methylene chloride	ug/m3	<190	<190	nm
t-Butyl alcohol (TBA)	ug/m3	<67	<67	nm
3-Chloropropene	ug/m3	<8.6	<8.6	nm
CFC-113	ug/m3	<4.2	<4.2	nm
Carbon disulfide	ug/m3	<34	<34	nm
Methyl t-butyl ether (MTBE)	ug/m3	<9.9	<9.9	nm
Vinyl acetate	ug/m3	<39	<39	nm
1,1-Dichloroethane	ug/m3	<2.2	<2.2	nm
cis-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Hexane	ug/m3	29	29	0
Chloroform	ug/m3	<0.27	<0.27	nm
Ethyl acetate	ug/m3	<40	<40	nm
Tetrahydrofuran	ug/m3	1.7	<1.6	nm
2-Butanone (MEK)	ug/m3	<16	<16	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.22	<0.22	nm
1,1,1-Trichloroethane	ug/m3	<3	<3	nm
Carbon tetrachloride	ug/m3	<1.7	<1.7	nm
Benzene	ug/m3	4.6	4.5	2
Cyclohexane	ug/m3	<38	<38	nm
1,2-Dichloropropane	ug/m3	<1.3	<1.3	nm
1,4-Dioxane	ug/m3	<2	<2	nm
2,2,4-Trimethylpentane	ug/m3	<26	<26	nm

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104571-02 1/5.5 (Duplicate) (continued)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Methyl methacrylate	ug/m3	<23	<23	nm
Heptane	ug/m3	<23	<23	nm
Bromodichloromethane	ug/m3	<0.37	<0.37	nm
Trichloroethene	ug/m3	<0.59	<0.59	nm
cis-1,3-Dichloropropene	ug/m3	<2.5	<2.5	nm
4-Methyl-2-pentanone	ug/m3	<23	<23	nm
trans-1,3-Dichloropropene	ug/m3	<2.5	<2.5	nm
Toluene	ug/m3	<100	<100	nm
1,1,2-Trichloroethane	ug/m3	<0.3	<0.3	nm
2-Hexanone	ug/m3	<23	<23	nm
Tetrachloroethene	ug/m3	340	340	0
Dibromochloromethane	ug/m3	<0.47	<0.47	nm
1,2-Dibromoethane (EDB)	ug/m3	<0.42	<0.42	nm
Chlorobenzene	ug/m3	<2.5	<2.5	nm
Ethylbenzene	ug/m3	2.7	2.7	0
1,1,2,2-Tetrachloroethane	ug/m3	<0.76	<0.76	nm
Nonane	ug/m3	<29	<29	nm
Isopropylbenzene	ug/m3	<14	<14	nm
2-Chlorotoluene	ug/m3	<28	<28	nm
Propylbenzene	ug/m3	<14	<14	nm
4-Ethyltoluene	ug/m3	<14	<14	nm
m,p-Xylene	ug/m3	11	11	0
o-Xylene	ug/m3	3.8	3.7	3
Styrene	ug/m3	<4.7	<4.7	nm
Bromoform	ug/m3	<11	<11	nm
Benzyl chloride	ug/m3	<0.28	<0.28	nm
1,3,5-Trimethylbenzene	ug/m3	<14	<14	nm
1,2,4-Trimethylbenzene	ug/m3	<14	<14	nm
1,3-Dichlorobenzene	ug/m3	<3.3	<3.3	nm
1,4-Dichlorobenzene	ug/m3	<1.3	<1.3	nm
1,2-Dichlorobenzene	ug/m3	<3.3	<3.3	nm
1,2,4-Trichlorobenzene	ug/m3	<4.1	<4.1	nm
Naphthalene	ug/m3	<1.4	<1.4	nm
Hexachlorobutadiene	ug/m3	<1.2	<1.2	nm

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Propene	ug/m3	23	113	70-130
Dichlorodifluoromethane	ug/m3	67	110	70-130
Chloromethane	ug/m3	28	114	70-130
F-114	ug/m3	94	113	70-130
Vinyl chloride	ug/m3	35	118	70-130
1,3-Butadiene	ug/m3	30	111	70-130
Butane	ug/m3	32	106	70-130
Bromomethane	ug/m3	52	124	70-130
Chloroethane	ug/m3	36	108	70-130
Vinyl bromide	ug/m3	59	119	70-130
Ethanol	ug/m3	25	120	70-130
Acrolein	ug/m3	31	116	70-130
Pentane	ug/m3	40	106	70-130
Trichlorofluoromethane	ug/m3	76	114	70-130
Acetone	ug/m3	32	114	70-130
2-Propanol	ug/m3	33	103	70-130
1,1-Dichloroethene	ug/m3	54	111	70-130
trans-1,2-Dichloroethene	ug/m3	54	112	70-130
Methylene chloride	ug/m3	94	99	70-130
t-Butyl alcohol (TBA)	ug/m3	41	108	70-130
3-Chloropropene	ug/m3	42	105	70-130
CFC-113	ug/m3	100	105	70-130
Carbon disulfide	ug/m3	42	117	70-130
Methyl t-butyl ether (MTBE)	ug/m3	49	109	70-130
Vinyl acetate	ug/m3	48	109	70-130
1,1-Dichloroethane	ug/m3	55	112	70-130
cis-1,2-Dichloroethene	ug/m3	54	111	70-130
Hexane	ug/m3	48	113	70-130
Chloroform	ug/m3	66	110	70-130
Ethyl acetate	ug/m3	49	107	70-130
Tetrahydrofuran	ug/m3	40	112	70-130
2-Butanone (MEK)	ug/m3	40	111	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	109	70-130
1,1,1-Trichloroethane	ug/m3	74	113	70-130
Carbon tetrachloride	ug/m3	85	114	70-130
Benzene	ug/m3	43	109	70-130
Cyclohexane	ug/m3	46	109	70-130
1,2-Dichloropropane	ug/m3	62	109	70-130
1,4-Dioxane	ug/m3	49	113	70-130
2,2,4-Trimethylpentane	ug/m3	63	109	70-130

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample (continued)

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Methyl methacrylate	ug/m3	55	115	70-130
Heptane	ug/m3	55	108	70-130
Bromodichloromethane	ug/m3	90	114	70-130
Trichloroethene	ug/m3	73	106	70-130
cis-1,3-Dichloropropene	ug/m3	61	104	70-130
4-Methyl-2-pentanone	ug/m3	55	100	70-130
trans-1,3-Dichloropropene	ug/m3	61	107	70-130
Toluene	ug/m3	51	110	70-130
1,1,2-Trichloroethane	ug/m3	74	111	70-130
2-Hexanone	ug/m3	55	111	70-130
Tetrachloroethene	ug/m3	92	108	70-130
Dibromochloromethane	ug/m3	120	118	70-130
1,2-Dibromoethane (EDB)	ug/m3	100	104	70-130
Chlorobenzene	ug/m3	62	111	70-130
Ethylbenzene	ug/m3	59	105	70-130
1,1,2,2-Tetrachloroethane	ug/m3	93	111	70-130
Nonane	ug/m3	71	110	70-130
Isopropylbenzene	ug/m3	66	120	70-130
2-Chlorotoluene	ug/m3	70	107	70-130
Propylbenzene	ug/m3	66	110	70-130
4-Ethyltoluene	ug/m3	66	106	70-130
m,p-Xylene	ug/m3	120	108	70-130
o-Xylene	ug/m3	59	107	70-130
Styrene	ug/m3	58	109	70-130
Bromoform	ug/m3	140	110	70-130
Benzyl chloride	ug/m3	70	93	70-130
1,3,5-Trimethylbenzene	ug/m3	66	112	70-130
1,2,4-Trimethylbenzene	ug/m3	66	107	70-130
1,3-Dichlorobenzene	ug/m3	81	106	70-130
1,4-Dichlorobenzene	ug/m3	81	108	70-130
1,2-Dichlorobenzene	ug/m3	81	106	70-130
1,2,4-Trichlorobenzene	ug/m3	100	102	70-130
Naphthalene	ug/m3	71	104	70-130
Hexachlorobutadiene	ug/m3	140	103	70-130

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

104514

SAMPLE CHAIN OF CUSTODY

ME 04/28/21

Page # 1 of 1

Report To Mike Brady
Company Parametrix
Address 719 2nd Ave Ste 200
City, State, ZIP Seattle, WA 98104
Phone 206.394.3700 Email mbrady@parametrix.com

SAMPLERS (signature)

PROJECT NAME & ADDRESS: SNoho Co – McCollum Park & Evander Landfill

PO # 373-1513-112

NOTES:

INVOICE TO: Parametrix

TURNAROUND TIME
- [X] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [X] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
GP-14	01	3347	35	IA / SG	4/28	-29	9:57	-4.75	10:02	X						
GP-15	02	3386	101	IA / SG		-29	10:41	-4.75	10:46	X						
GP-19	03	3674	117	IA / SG		-31	11:30	-4.75	11:35	X						
GP-18	04	3671	07	IA / SG		-29	11:54	-4.75	11:59	X						
BH07	05	3385	106	IA / SG		-30	12:36	-4.75	12:41	X						
FLARE	06	3483	105	IA / SG	V	-31	12:59	-4.75	13:04	X						CH4 14.7%
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Mike Brady	Parametrix	4/28/21	14:19
Received by:	Nhan Phan	FCBT	4/28/21	1419
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COCTO-15.DOC

Samples received at 20 °C

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Flare	Client:	Parametrix
Date Received:	04/28/21	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	04/28/21	Lab ID:	104514-06 1/98
Date Analyzed:	05/07/21	Data File:	050630.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	109	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<120	<69	1,2-Dichloropropane	<23	<4.9
Dichlorodifluoromethane	540	110	1,4-Dioxane	<35	<9.8
Chloromethane	<360	<180	2,2,4-Trimethylpentane	1,000	220
F-114	1,200	170	Methyl methacrylate	<400	<98
Vinyl chloride	110	42	Heptane	730	180
1,3-Butadiene	<4.3	<2	Bromodichloromethane	<6.6	<0.98
Butane	860	360	Trichloroethene	<11	<2
Bromomethane	<230	<59	cis-1,3-Dichloropropene	<44	<9.8
Chloroethane	<260	<98	4-Methyl-2-pentanone	<400	<98
Vinyl bromide	<43	<9.8	trans-1,3-Dichloropropene	<44	<9.8
Ethanol	<740	<390	Toluene	<1,800	<490
Acrolein	<11	<4.9	1,1,2-Trichloroethane	<5.3	<0.98
Pentane	690	230	2-Hexanone	<400	<98
Trichlorofluoromethane	<220	<39	Tetrachloroethene	<660	<98
Acetone	<470	<200	Dibromochloromethane	<8.3	<0.98
2-Propanol	<840	<340	1,2-Dibromoethane (EDB)	<7.5	<0.98
1,1-Dichloroethene	<39	<9.8	Chlorobenzene	290	64
trans-1,2-Dichloroethene	<39	<9.8	Ethylbenzene	280	65
Methylene chloride	<3,400	<980	1,1,2,2-Tetrachloroethane	<13	<2
t-Butyl alcohol (TBA)	<1,200	<390	Nonane	<510	<98
3-Chloropropene	<150	<49	Isopropylbenzene	<240	<49
CFC-113	<75	<9.8	2-Chlorotoluene	<510	<98
Carbon disulfide	<610	<200	Propylbenzene	<240	<49
Methyl t-butyl ether (MTBE)	<180	<49	4-Ethyltoluene	<240	<49
Vinyl acetate	<690	<200	m,p-Xylene	280	65
1,1-Dichloroethane	<40	<9.8	o-Xylene	64	15
cis-1,2-Dichloroethene	<39	<9.8	Styrene	<83	<20
Hexane	960	270	Bromoform	<200	<20
Chloroform	<4.8	<0.98	Benzyl chloride	<5.1	<0.98
Ethyl acetate	<710	<200	1,3,5-Trimethylbenzene	<240	<49
Tetrahydrofuran	<30	<9.8	1,2,4-Trimethylbenzene	440	90
2-Butanone (MEK)	<290	<98	1,3-Dichlorobenzene	<59	<9.8
1,2-Dichloroethane (EDC)	<4	<0.98	1,4-Dichlorobenzene	210	35
1,1,1-Trichloroethane	<53	<9.8	1,2-Dichlorobenzene	<59	<9.8
Carbon tetrachloride	<31	<4.9	1,2,4-Trichlorobenzene	<73	<9.8
Benzene	160	50	Naphthalene	<26	<4.9
Cyclohexane	800	230	Hexachlorobutadiene	<21	<2

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Parametrix
Date Received:	Not Applicable	Project:	McCollum Park and Emander Landfill 373-1513-112
Date Collected:	Not Applicable	Lab ID:	01-1057 MB2
Date Analyzed:	05/06/21	Data File:	050615.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	<0.49	<0.1	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	<0.11	<0.05	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	<0.049	<0.01	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	<0.31	<0.05	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.26	<0.05
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104571-02 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Propene	ug/m3	<6.6	<6.6	nm
Dichlorodifluoromethane	ug/m3	2.8	<2.7	nm
Chloromethane	ug/m3	<20	<20	nm
F-114	ug/m3	<3.8	<3.8	nm
Vinyl chloride	ug/m3	<1.4	<1.4	nm
1,3-Butadiene	ug/m3	2.1	2.2	5
Butane	ug/m3	84	86	2
Bromomethane	ug/m3	<13	<13	nm
Chloroethane	ug/m3	<15	<15	nm
Vinyl bromide	ug/m3	<2.4	<2.4	nm
Ethanol	ug/m3	710	900	24
Acrolein	ug/m3	0.95	0.86	10
Pentane	ug/m3	54	52	4
Trichlorofluoromethane	ug/m3	<12	<12	nm
Acetone	ug/m3	250	240	4
2-Propanol	ug/m3	<47	<47	nm
1,1-Dichloroethene	ug/m3	<2.2	<2.2	nm
trans-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Methylene chloride	ug/m3	<190	<190	nm
t-Butyl alcohol (TBA)	ug/m3	<67	<67	nm
3-Chloropropene	ug/m3	<8.6	<8.6	nm
CFC-113	ug/m3	<4.2	<4.2	nm
Carbon disulfide	ug/m3	<34	<34	nm
Methyl t-butyl ether (MTBE)	ug/m3	<9.9	<9.9	nm
Vinyl acetate	ug/m3	<39	<39	nm
1,1-Dichloroethane	ug/m3	<2.2	<2.2	nm
cis-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Hexane	ug/m3	29	29	0
Chloroform	ug/m3	<0.27	<0.27	nm
Ethyl acetate	ug/m3	<40	<40	nm
Tetrahydrofuran	ug/m3	1.7	<1.6	nm
2-Butanone (MEK)	ug/m3	<16	<16	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.22	<0.22	nm
1,1,1-Trichloroethane	ug/m3	<3	<3	nm
Carbon tetrachloride	ug/m3	<1.7	<1.7	nm
Benzene	ug/m3	4.6	4.5	2
Cyclohexane	ug/m3	<38	<38	nm
1,2-Dichloropropane	ug/m3	<1.3	<1.3	nm
1,4-Dioxane	ug/m3	<2	<2	nm
2,2,4-Trimethylpentane	ug/m3	<26	<26	nm

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104571-02 1/5.5 (Duplicate) (continued)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Methyl methacrylate	ug/m3	<23	<23	nm
Heptane	ug/m3	<23	<23	nm
Bromodichloromethane	ug/m3	<0.37	<0.37	nm
Trichloroethene	ug/m3	<0.59	<0.59	nm
cis-1,3-Dichloropropene	ug/m3	<2.5	<2.5	nm
4-Methyl-2-pentanone	ug/m3	<23	<23	nm
trans-1,3-Dichloropropene	ug/m3	<2.5	<2.5	nm
Toluene	ug/m3	<100	<100	nm
1,1,2-Trichloroethane	ug/m3	<0.3	<0.3	nm
2-Hexanone	ug/m3	<23	<23	nm
Tetrachloroethene	ug/m3	340	340	0
Dibromochloromethane	ug/m3	<0.47	<0.47	nm
1,2-Dibromoethane (EDB)	ug/m3	<0.42	<0.42	nm
Chlorobenzene	ug/m3	<2.5	<2.5	nm
Ethylbenzene	ug/m3	2.7	2.7	0
1,1,2,2-Tetrachloroethane	ug/m3	<0.76	<0.76	nm
Nonane	ug/m3	<29	<29	nm
Isopropylbenzene	ug/m3	<14	<14	nm
2-Chlorotoluene	ug/m3	<28	<28	nm
Propylbenzene	ug/m3	<14	<14	nm
4-Ethyltoluene	ug/m3	<14	<14	nm
m,p-Xylene	ug/m3	11	11	0
o-Xylene	ug/m3	3.8	3.7	3
Styrene	ug/m3	<4.7	<4.7	nm
Bromoform	ug/m3	<11	<11	nm
Benzyl chloride	ug/m3	<0.28	<0.28	nm
1,3,5-Trimethylbenzene	ug/m3	<14	<14	nm
1,2,4-Trimethylbenzene	ug/m3	<14	<14	nm
1,3-Dichlorobenzene	ug/m3	<3.3	<3.3	nm
1,4-Dichlorobenzene	ug/m3	<1.3	<1.3	nm
1,2-Dichlorobenzene	ug/m3	<3.3	<3.3	nm
1,2,4-Trichlorobenzene	ug/m3	<4.1	<4.1	nm
Naphthalene	ug/m3	<1.4	<1.4	nm
Hexachlorobutadiene	ug/m3	<1.2	<1.2	nm

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Propene	ug/m3	23	113	70-130
Dichlorodifluoromethane	ug/m3	67	110	70-130
Chloromethane	ug/m3	28	114	70-130
F-114	ug/m3	94	113	70-130
Vinyl chloride	ug/m3	35	118	70-130
1,3-Butadiene	ug/m3	30	111	70-130
Butane	ug/m3	32	106	70-130
Bromomethane	ug/m3	52	124	70-130
Chloroethane	ug/m3	36	108	70-130
Vinyl bromide	ug/m3	59	119	70-130
Ethanol	ug/m3	25	120	70-130
Acrolein	ug/m3	31	116	70-130
Pentane	ug/m3	40	106	70-130
Trichlorofluoromethane	ug/m3	76	114	70-130
Acetone	ug/m3	32	114	70-130
2-Propanol	ug/m3	33	103	70-130
1,1-Dichloroethene	ug/m3	54	111	70-130
trans-1,2-Dichloroethene	ug/m3	54	112	70-130
Methylene chloride	ug/m3	94	99	70-130
t-Butyl alcohol (TBA)	ug/m3	41	108	70-130
3-Chloropropene	ug/m3	42	105	70-130
CFC-113	ug/m3	100	105	70-130
Carbon disulfide	ug/m3	42	117	70-130
Methyl t-butyl ether (MTBE)	ug/m3	49	109	70-130
Vinyl acetate	ug/m3	48	109	70-130
1,1-Dichloroethane	ug/m3	55	112	70-130
cis-1,2-Dichloroethene	ug/m3	54	111	70-130
Hexane	ug/m3	48	113	70-130
Chloroform	ug/m3	66	110	70-130
Ethyl acetate	ug/m3	49	107	70-130
Tetrahydrofuran	ug/m3	40	112	70-130
2-Butanone (MEK)	ug/m3	40	111	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	109	70-130
1,1,1-Trichloroethane	ug/m3	74	113	70-130
Carbon tetrachloride	ug/m3	85	114	70-130
Benzene	ug/m3	43	109	70-130
Cyclohexane	ug/m3	46	109	70-130
1,2-Dichloropropane	ug/m3	62	109	70-130
1,4-Dioxane	ug/m3	49	113	70-130
2,2,4-Trimethylpentane	ug/m3	63	109	70-130

Date of Report: 05/13/21
Date Received: 04/28/21
Project: McCollum Park and Emander Landfill 373-1513-112, F&BI 104514

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample (continued)

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Methyl methacrylate	ug/m3	55	115	70-130
Heptane	ug/m3	55	108	70-130
Bromodichloromethane	ug/m3	90	114	70-130
Trichloroethene	ug/m3	73	106	70-130
cis-1,3-Dichloropropene	ug/m3	61	104	70-130
4-Methyl-2-pentanone	ug/m3	55	100	70-130
trans-1,3-Dichloropropene	ug/m3	61	107	70-130
Toluene	ug/m3	51	110	70-130
1,1,2-Trichloroethane	ug/m3	74	111	70-130
2-Hexanone	ug/m3	55	111	70-130
Tetrachloroethene	ug/m3	92	108	70-130
Dibromochloromethane	ug/m3	120	118	70-130
1,2-Dibromoethane (EDB)	ug/m3	100	104	70-130
Chlorobenzene	ug/m3	62	111	70-130
Ethylbenzene	ug/m3	59	105	70-130
1,1,2,2-Tetrachloroethane	ug/m3	93	111	70-130
Nonane	ug/m3	71	110	70-130
Isopropylbenzene	ug/m3	66	120	70-130
2-Chlorotoluene	ug/m3	70	107	70-130
Propylbenzene	ug/m3	66	110	70-130
4-Ethyltoluene	ug/m3	66	106	70-130
m,p-Xylene	ug/m3	120	108	70-130
o-Xylene	ug/m3	59	107	70-130
Styrene	ug/m3	58	109	70-130
Bromoform	ug/m3	140	110	70-130
Benzyl chloride	ug/m3	70	93	70-130
1,3,5-Trimethylbenzene	ug/m3	66	112	70-130
1,2,4-Trimethylbenzene	ug/m3	66	107	70-130
1,3-Dichlorobenzene	ug/m3	81	106	70-130
1,4-Dichlorobenzene	ug/m3	81	108	70-130
1,2-Dichlorobenzene	ug/m3	81	106	70-130
1,2,4-Trichlorobenzene	ug/m3	100	102	70-130
Naphthalene	ug/m3	71	104	70-130
Hexachlorobutadiene	ug/m3	140	103	70-130

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

104514

SAMPLE CHAIN OF CUSTODY

ME 04/28/21

Page # 1 of 1

Report To Mike Brady
Company Parametrix
Address 719 2nd Ave Ste 200
City, State, ZIP Seattle, WA 98104
Phone 206.394.3700 Email mbrady@parametrix.com

SAMPLERS (signature)

PROJECT NAME & ADDRESS: SNoho Co – McCollum Park & Evander Landfill

PO # 373-1513-112

NOTES:

INVOICE TO: Parametrix

TURNAROUND TIME
- [X] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [X] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
GP-14	01	3347	35	IA / SG	4/28	-29	9:57	-4.75	10:02	X						
GP-15	02	3386	101	IA / SG		-29	10:41	-4.75	10:46	X						
GP-19	03	3674	117	IA / SG		-31	11:30	-4.75	11:35	X						
GP-18	04	3671	07	IA / SG		-29	11:54	-4.75	11:59	X						
BH07	05	3385	106	IA / SG		-30	12:36	-4.75	12:41	X						
FLARE	06	3483	105	IA / SG	V	-31	12:59	-4.75	13:04	X						CH4 14.7%
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Mike Brady	Parametrix	4/28/21	14:19
Received by:	Nhan Phan	FCBT	4/28/21	1419
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COCTO-15.DOC

Samples received at 20 °C

This Page Intentionally Left Blank

Appendix B

EMB Consulting - Preliminary Vapor Intrusion Assessment, McCollum Pioneer Park

PRELIMINARY VAPOR INTRUSION ASSESSMENT

McCOLLUM PIONEER PARK

McCOLLUM PARK POOL BUILDING
WASHINGTON STATE UNIVERSITY EXTENSION OFFICE
WASHINGTON STATE UNIVERSITY EDUCATION BUILDING

April 1, 2021

Prepared for:

Snohomish County

Prepared by:

EMB Consulting, LLC

EMB CONSULTING * 22725 44TH AVE W, SUITE 203 * MOUNTLAKE TERRACE, WASHINGTON
206.915.2395 * EMBLACKCONSULT@GMAIL.COM

Project Title:	Preliminary Vapor Intrusion Assessment McCollum Pioneer Park McCollum Park Pool Building Washington State University Extension Office Washington State University Education Building
Prepared For:	Snohomish County
EMB Consulting Project Number:	1620

Elisabeth Black, CIH
Certified Industrial Hygienist
EMB Consulting LLC

Report Date: April 1, 2021

TABLE OF CONTENTS

ACRONYMS

µg/m^3	micrograms per cubic meter
ASIL	Acceptable Source Impact Level
BETX	benzene, ethylbenzene, toluene, xylenes
CLARC	Cleanup Levels and Risk Calculations
County	Snohomish County
CUL	Cleanup Level
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
F&BI	Friedman & Bruya, Inc.
GC/MS	Gas Chromatography/Mass Spectrophotometry
Landfill	Emander Landfill
MTCA	Model Toxics Control Act
Pool	McCallum Park Pool
RL	Reporting Limit
Site	McCollum Pioneer Park
VOCs	Volatile Organic Compounds
WSU Education	Washington State University Education
WSU Extension	Washington State University Extension

1.0 Introduction

This document presents the results of a preliminary vapor intrusion assessment conducted from March 9 to 10, 2021 for three buildings located in the Snohomish County (County) McCollum Pioneer Park in unincorporated Snohomish County, Washington (Site). McCollum Pioneer Park was developed in the 1990s, partially covering the site of the former Emander Landfill (landfill). Three Site buildings located on or near the estimated former landfill footprint were selected for sampling during this assessment, to include: the Pioneer Park Pool building (Pool), the Washington State University Extension Office (WSU Extension), and the Washington State University Education Building (WSU Education). The objective of this preliminary vapor intrusion assessment was to determine if volatile organic compounds (VOCs) from the former landfill could impact indoor air for buildings on the Site.

The following sections of this report describe the Site background, sampling methods, results, conclusions, and recommendations. Attachments to this report include a summary table of air sample data and the laboratory analytical report. Data on ambient weather during sampling is also included, as it can have an impact on the potential for vapor intrusion.

2.0 Background

Background and environmental data for the former Emander Landfill were extracted from the Washington State Department of Ecology (Ecology) Periodic Review of the McCollum County Park, formerly the Emander Landfill Facility - Site ID#: 2732 Periodic Review, dated November 2016. Extracted text is indicated in italics.

2.1 Site Description

McCollum County Park, known in Ecology records as McCollum Park, is located at 600 128th Street SE, approximately 1/2 mile east of Interstate 5 on 128th Street SE in Snohomish County, Washington. It's an unincorporated area near the city limits of Mill Creek. The Emander Landfill (landfill) comprised most of the northern half of the 78-acre park. The landfill extended beneath 128th Street SE to the north, across Dumas Road to the east and is bordered by North Creek to the west and wooded parkland to the south. …

The landfill occupies property acquired by the County beginning in 1922. Gravel mining operations commenced in 1929. The gravel pit was used by the County for refuse disposal from about 1947 to 1967, and was known as the Emander Landfill during and following landfill operations. Landfilling operations were substantially completed by 1967, and a soil cover was installed. The Site was

subsequently turned over to the Snohomish County Parks and Recreation Department for development as McCollum County Park, and a transit Park and Ride at 620 128th Street SE was developed over the north part of the landfill. Little documentation is available regarding disposal operations at the landfill; however, pre-RI and AGI's 1995 RI encountered refuse typical of municipal solid waste landfills, including glass, plastic, paper, wood, metal, and concrete demolition debris. This refuse is mixed with soil in varying percentages throughout the landfill, and contains petroleum hydrocarbons in several areas. Former truck drivers indicate fuel storage tank bottoms were disposed of at the approximate location where the sludge was encountered. In addition, anecdotal information suggests septic tank contents and ship bilge water were also disposed of at the landfill.

2.2 Site Environmental Data

Detailed environmental data for the landfill are available at the Ecology website for the Site at:

Washington State Department of Ecology Facility Site ID 2732

During investigation of the Site in the 1990s, the following conditions were noted related to soil-gas.

VOCs were detected in soil gas samples; concentrations were below state Acceptable Source Impact Levels (ASIL) for all compounds. ASILs for benzene, ethylbenzene, toluene, and xylenes (BETX), TPH diesel, and hydrogen sulfide were exceeded in an air sample collected directly above exposed sludge.

It should be noted that the ASILs were used for site assessment of soil gasses in the 1990s, but have since been replaced by Ecology Model Toxics Control Act (MTCA) Cleanup Levels (CULs) and Risk Calculations (CLARC). The CLARC values are available for soil, groundwater, surface water, sediment, and air. This assessment relies on the MTCA Method B Vapor Intrusion CULs (February 2021). The MTCA CULs are more conservative than the 1990s ASILs referenced in the Ecology site history.

3.0 Methods

The Environmental Protection Agency (EPA) Method TO-15 was selected for a general scan of potential volatile organic compounds (VOCs) for this project. Samples were collected in accordance with EPA Method TO-15 using six-liter summa-type evacuated cylinders with regulators calibrated to collect samples over 24 hours. For this project, six samples were collected, with two from each of the three Site buildings: Pool, WSU Extension, and WSU Education. Once complete, the six samples were analyzed at the Friedman & Bruya, Inc. (F&BI)

laboratory by gas chromatography/mass spectrometry (GC/MS). The F&BI analytical report is included as Attachment A.

The field sampling program was carried out during a 24-hour period over two consecutive days to account for fluctuations in temperature, ambient pressure, and Site activities. Changes in these conditions can affect the flow of soil-gas and outdoor air into the buildings. Weather data for the Site area for March 9 and 10, 2021 are provided with this report in Attachment B and summarized in the Results section.

Beginning on the morning of Tuesday March 9, 2021, EMB Consulting initiated sampling inside the buildings between 9 and 10 am. The samples were completed on Wednesday March 10, 2021 between 7:30 and 8:30 am.

The samples collected and locations are described below.

- **Sample 030921-Pool1** was collected from the lobby area of the pool building. The sample was set on the floor, which is carpet over concrete. The pool building was vacant and it is unknown if anyone entered the building during sampling. The outdoor Pool has been closed to the public since Summer of 2019 due to the COVID-19 pandemic and operating seasons.

- **Sample 030921-Pool2** was collected from the Women's Locker Room of the pool building. The sample was set on the floor, which is ceramic tile over concrete.

- **Sample 030921-WSU1** was collected from a northeast office of the WSU Extension Building. The sample was set on the floor, which has carpet over concrete. The WSU Extension Building was minimally occupied with office staff during sampling. The office where the sample was placed was not occupied during sampling.

- **Sample 030921-WSU2** was collected from the southwest office of the WSU Extension Building. The sample was set on the floor, which has carpet over concrete. The office where the sample was placed was being used for storage and not occupied during sampling.

- **Sample 030921-Ed1** was collected from the Evergreen Classroom in the WSU Education Building. The Evergreen Classroom is located on the west side of the building. The sample was set on the floor, which has carpet over concrete. The WSU Education Building was not occupied during sampling.

- **Sample 030921-Ed2** was collected from the Cougar Classroom in the WSU Education Building. The Cougar Classroom is located on the east side of the building. The sample was set on the floor, which has carpet over concrete.

4.0 Results

The analytical results for the six samples are summarized in Table 1 attached to this report. The EPA TO-15 Method provides results for 74 VOCs. For ease of interpretation, Table 1 only includes 22 VOCs that were detected above the laboratory reporting limit (RL) in one or more sample. The full list of analytes for each sample is provided in the F&BI laboratory report in Attachment A.

The 22 VOCs identified by the TO-15 analysis were compared with the Ecology MTCA Method B Vapor Intrusion CUL Table (February 2021). Ecology has established MTCA CULs based on each VOC's toxicological profile. Some VOCs have a CUL for non-cancer health effects and another CUL for cancer health effects, if data indicates that they are a carcinogen. For some VOCs, Ecology has not established a CUL. CULs are provided on Table 1, where they have been established. If there is currently no CUL, the cell is shaded.

4.1 Volatile Organic Compound Results

For the Pool building, the following VOCs were detected by the laboratory and were present in concentrations exceeding the Ecology MTCA Method B Vapor Intrusion CUL.

- Dichloroethane, 1,2-
- Dichlorobenzene, 1,4-
- Benzene
- Chloroform
- Naphthalene

For the WSU Extension Office, the following VOCs were detected by the laboratory and were present in concentrations exceeding the Ecology MTCA Method B Vapor Intrusion CUL.

- Dichloroethane, 1,2-
- Butadiene, 1,3-
- Dichlorobenzene, 1,4-
- Benzene
- Carbon Tetrachloride
- Chloroform
- Naphthalene

For the WSU Education Building, the following VOCs were detected by the laboratory and were present in concentrations exceeding the Ecology MTCA Method B Vapor Intrusion CUL.

- Butadiene, 1,3-
- Benzene

- Chloroform
- Naphthalene

It should be noted that butane was also present is unusually high concentrations in the Pool Building, and at lower concentrations in the other two buildings. Although Ecology does not have a CUL for butane, its presence may suggest intrusion from landfill gas. Butane is primarily hazardous as flammable gas in much high concentrations than detected in the buildings. The presence is unusual for an indoor space.

4.2 Atmospheric Conditions

The influence of barometric pressure and ambient conditions on the potential release of VOCs in soil-gas to indoor air was also evaluated in this assessment. Changes in atmospheric pressure may create a “piston-like” force on soil vapor, possibly causing a cyclic up and down flow of contaminant vapors into and out of buildings. Soil vapor compression and expansion in response to barometric pressure fluctuations may alternately enhance or inhibit vapor intrusion. Vapor intrusion into buildings is typically higher during periods of low barometric pressure.

The barometric pressure readings recorded at a nearby weather station fluctuated between 29.61 and 29.65 inches of mercury. The average barometric pressure for the Puget Sound region in March is 30.5 inches of mercury, so the sampling event occurred during relatively low barometric pressure. Based on this, the VOCs detected during this sampling event were likely higher than typically present.

Temperature fluctuated between 31 and 54 degrees Fahrenheit. Weather data for the two days on which sampling occurred are included with this report in Attachment B.

5.0 Conclusions and Recommendations

Based on the results of this assessment, it appears possible that landfill gasses are impacting indoor air in the three buildings assessed at the Site (Pool building, WSU Extension Office, and WSU Educations Building).

The Ecology CULs for vapor intrusion are very conservative and rely on assumptions of duration of occupancy that do not reflect the current users. The calculation assumes an exposure duration of 30 years. Based on the types of operations on the Site, it is very unlikely that any of the building occupants would spend that much time in the buildings.

The sampling for this project occurred during a period of low barometric pressure, which may have resulted in VOC concentrations in the building higher

than what is typical.

This preliminary data indicate the need for further investigation to define the source and extent of VOCs on the Site. I recommend that Snohomish County consult with an environmental engineering firm to perform a full vapor intrusion assessment for the Site in accordance with Ecology guidance documents. The full vapor intrusion assessment should include other buildings that were not addressed during this preliminary vapor intrusion assessment and should establish more realistic CULs for the facilities at the Site.

6.0 References

Washington State Department of Ecology. Air Cleanup Levels WAC 173-340-750. Equations and Default Values for Calculating Concentrations Protective of Human Health – Inhalation Pathway

Washington State Department of Ecology. McCollum County Park, formerly the Emander Landfill Facility Site ID#: 2732 Periodic Review. November 2016

Washington State Department of Ecology. Model Toxics Control Act (MTCA) Cleanup Levels and Risk Calculations (CLARC) Vapor Intrusion Method B Table. February 2021.

Table

Table 1 - Summary of Volatile Organic Compound Sample Results
McCollum Pioneer Park
McCollum Park Pool Building (Pool)
Washington State University Extension Office (WSU)
Washington State University Education Building (Ed)
March 9 to 10, 2021

Volatile Organic Compounds be EPA Method TO-15	030921-Pool1 µg/m³	030921-Pool2 µg/m³	030921-WSU1 µg/m³	030921-WSU2 µg/m³	030921-Ed1 µg/m³	030921-Ed2 µg/m³	Indoor Air Cleanup Level Method B Noncancer[a] µg/m³	Indoor Air Cleanup Level Method B Cancer[a] µg/m³
1,2-Dichloroethane	0.085	**0.10**	**0.18**	**0.23**	0.089	0.081	3.2	0.0962
1,2,4-Trimethylbenzene	5.7	5.1	<2.5	<2.5	<2.5	<2.5	27.4	
1,3-Butadiene	<0.044	<0.062	**0.21**	**0.18**	**0.23**	**0.17**	0.914	0.0833
1,4-Dichlorobenzene	**5.9**	**3.6**	**0.57**	**1.2**	<2.3	<0.23	366	0.227
2-Propanol	<8.6	<12	<8.6	10	<8.6	<8.6	91	
Acetone	<4.8	<6.7	7.4	9.6	8.1	<4.8	14,200	
Benzene	**4.0**	**2.6**	**0.92**	**0.87**	**2.1**	**0.89**	13.7	0.321
Butane	110	62	6.7	6.3	11	5.8		
Carbon Tetrachloride	0.40	<0.44	**0.42**	0.40	0.40	0.40	45.7	0.417
Chloroform	**0.24**	**0.23**	**0.20**	**0.21**	**0.17**	**0.15**	44.8	0.109
Dichlorodifluoromethane	2.0	2.3	2.2	2.3	2.2	2.2	45.7	
Ethanol	33	26	21	39	13	13		
Ethyl Acetate	<7.2	<10	<7.2	8.9	<7.2	<7.2	32	
Ethylbenzene	2.3	1.4	<0.43	<0.43	2.0	<0.43	457	
Heptane	4.4	<5.7	<4.1	<4.1	<4.1	<4.1	183	
Hexane	7.8	5.5	<3.5	<3.5	4.8	<3.5	320	
Methylene Chloride	<35	<49	<35	<35	*46*[b]	<35	274	65.8
Naphthalene	**0.51**	**0.23**	**0.24**	**0.62**	**0.23**	**0.089**	1.37	0.0735
Pentane	25	14	<3	<3	8.9	<3	460	
Toluene	23	<26	<19	<19	19	<19	2,290	
Xylene, m,p-	9.5	5.8	1.1	1.2	8.0	1.2	45.7	
Xylene, o	3.0	1.9	<0.43	0.56	2.5	<0.43	45.7	

< = Not detected at or above laboratory reporting limit. These result cells are also shaded for easier data interpretation.

a = Washington State Department of Ecology - Cleanup Levels and Risk Calculation (CLARC) Vapor Intrusion Method B Table - February 2021. The cells are shaded where no criteria have been established.

b = The presence of the analyte is likely due to laboratory contamination

ATTACHMENT A
Laboratory Analytical Report
Friedman & Bruya, Inc.
F&BI 103177

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 19, 2021

Elisabeth Black, Project Manager
EMB Consulting
22725 44th Ave W, Suite 203
Mountlake Terrace, WA 98043

Dear Ms Black:

Included are the results from the testing of material submitted on March 10, 2021 from the McCollum Park, F&BI 103177 project. There are 13 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: emblackconsult@gmail.com
NAA0319R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on March 10, 2021 by Friedman & Bruya, Inc. from the EMB Consulting McCollum Park, F&BI 103177 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	EMB Consulting
103177 -01	030921-Pool1
103177 -02	030921-Pool2
103177 -03	030921-WSU1
103177 -04	030921-WSU2
103177 -05	030921-Ed1
103177 -06	030921-Ed2

The butane and ethanol concentration for several samples exceeded the calibration range. The data were flagged accordingly.

Methylene chloride was detected in the TO-15 analysis of sample 030921-Ed1. The data were flagged as due to laboratory contamination.

All other quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	030921-Pool1	Client:	EMB Consulting
Date Received:	03/10/21	Project:	McCollum Park, F&BI 103177
Date Collected:	03/09/21	Lab ID:	103177-01
Date Analyzed:	03/16/21	Data File:	031522.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.0	0.40	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	4.4	1.1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	110 ve	45 ve	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	33 ve	17 ve	Toluene	23	6.2
Acrolein	<2.1	<0.9	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	25	8.4	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	2.3	0.52
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	9.5	2.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	3.0	0.68
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	7.8	2.2	Bromoform	<2.1	<0.2
Chloroform	0.24	0.050	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	5.7	1.2
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.085	0.021	1,4-Dichlorobenzene	5.9	0.98
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.40	0.063	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	4.0	1.2	Naphthalene	0.51	0.098
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	030921-Pool2	Client:	EMB Consulting
Date Received:	03/10/21	Project:	McCollum Park, F&BI 103177
Date Collected:	03/09/21	Lab ID:	103177-02 1/1.4
Date Analyzed:	03/16/21	Data File:	031523.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.7	<0.98	1,2-Dichloropropane	<0.32	<0.07
Dichlorodifluoromethane	2.3	0.46	1,4-Dioxane	<0.5	<0.14
Chloromethane	<5.2	<2.5	2,2,4-Trimethylpentane	<6.5	<1.4
F-114	<0.98	<0.14	Methyl methacrylate	<5.7	<1.4
Vinyl chloride	<0.36	<0.14	Heptane	<5.7	<1.4
1,3-Butadiene	<0.062	<0.028	Bromodichloromethane	<0.094	<0.014
Butane	62 ve	26 ve	Trichloroethene	<0.15	<0.028
Bromomethane	<3.3	<0.84	cis-1,3-Dichloropropene	<0.64	<0.14
Chloroethane	<3.7	<1.4	4-Methyl-2-pentanone	<5.7	<1.4
Vinyl bromide	<0.61	<0.14	trans-1,3-Dichloropropene	<0.64	<0.14
Ethanol	26	14	Toluene	<26	<7
Acrolein	<2.9	<1.3	1,1,2-Trichloroethane	<0.076	<0.014
Pentane	14	4.8	2-Hexanone	<5.7	<1.4
Trichlorofluoromethane	<3.1	<0.56	Tetrachloroethene	<9.5	<1.4
Acetone	<6.7	<2.8	Dibromochloromethane	<0.12	<0.014
2-Propanol	<12	<4.9	1,2-Dibromoethane (EDB)	<0.11	<0.014
1,1-Dichloroethene	<0.56	<0.14	Chlorobenzene	<0.64	<0.14
trans-1,2-Dichloroethene	<0.56	<0.14	Ethylbenzene	1.4	0.33
Methylene chloride	<49	<14	1,1,2,2-Tetrachloroethane	<0.19	<0.028
t-Butyl alcohol (TBA)	<17	<5.6	Nonane	<7.3	<1.4
3-Chloropropene	<2.2	<0.7	Isopropylbenzene	<3.4	<0.7
CFC-113	<1.1	<0.14	2-Chlorotoluene	<7.2	<1.4
Carbon disulfide	<8.7	<2.8	Propylbenzene	<3.4	<0.7
Methyl t-butyl ether (MTBE)	<2.5	<0.7	4-Ethyltoluene	<3.4	<0.7
Vinyl acetate	<9.9	<2.8	m,p-Xylene	5.8	1.3
1,1-Dichloroethane	<0.57	<0.14	o-Xylene	1.9	0.43
cis-1,2-Dichloroethene	<0.56	<0.14	Styrene	<1.2	<0.28
Hexane	5.5	1.6	Bromoform	<2.9	<0.28
Chloroform	0.23	0.048	Benzyl chloride	<0.072	<0.014
Ethyl acetate	<10	<2.8	1,3,5-Trimethylbenzene	<3.4	<0.7
Tetrahydrofuran	<0.41	<0.14	1,2,4-Trimethylbenzene	5.1	1.0
2-Butanone (MEK)	<4.1	<1.4	1,3-Dichlorobenzene	<0.84	<0.14
1,2-Dichloroethane (EDC)	0.10	0.025	1,4-Dichlorobenzene	3.6	0.60
1,1,1-Trichloroethane	<0.76	<0.14	1,2-Dichlorobenzene	<0.84	<0.14
Carbon tetrachloride	<0.44	<0.07	1,2,4-Trichlorobenzene	<1	<0.14
Benzene	2.6	0.83	Naphthalene	0.23	0.045
Cyclohexane	<9.6	<2.8	Hexachlorobutadiene	<0.3	<0.028

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	030921-WSU1	Client:	EMB Consulting
Date Received:	03/10/21	Project:	McCollum Park, F&BI 103177
Date Collected:	03/09/21	Lab ID:	103177-03
Date Analyzed:	03/16/21	Data File:	031524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.2	0.44	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	0.21	0.096	Bromodichloromethane	<0.067	<0.01
Butane	6.7	2.8	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	21	11	Toluene	<19	<5
Acrolein	<2.1	<0.9	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	7.4	3.1	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	1.1	0.24
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.20	0.041	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.18	0.044	1,4-Dichlorobenzene	0.57	0.094
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.42	0.067	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	0.92	0.29	Naphthalene	0.24	0.046
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	030921-WSU2	Client:	EMB Consulting
Date Received:	03/10/21	Project:	McCollum Park, F&BI 103177
Date Collected:	03/09/21	Lab ID:	103177-04
Date Analyzed:	03/16/21	Data File:	031525.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.3	0.46	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	0.18	0.083	Bromodichloromethane	<0.067	<0.01
Butane	6.3	2.6	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	39 ve	21 ve	Toluene	<19	<5
Acrolein	<2.1	<0.9	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	9.6	4.0	Dibromochloromethane	<0.085	<0.01
2-Propanol	10	4.1	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	1.2	0.28
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	0.56	0.13
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.21	0.043	Benzyl chloride	<0.052	<0.01
Ethyl acetate	8.9	2.5	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.23	0.057	1,4-Dichlorobenzene	1.2	0.20
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.40	0.064	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	0.87	0.27	Naphthalene	0.62	0.12
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	030921-Ed1	Client:	EMB Consulting
Date Received:	03/10/21	Project:	McCollum Park, F&BI 103177
Date Collected:	03/09/21	Lab ID:	103177-05
Date Analyzed:	03/16/21	Data File:	031526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.2	0.43	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	0.23	0.11	Bromodichloromethane	<0.067	<0.01
Butane	11	4.7	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	13	6.7	Toluene	19	5.0
Acrolein	<2.1	<0.9	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	8.9	3.0	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	8.1	3.4	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	2.0	0.45
Methylene chloride	46 lc	13 lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	8.0	1.8
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	2.5	0.56
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	4.8	1.4	Bromoform	<2.1	<0.2
Chloroform	0.17	0.034	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.089	0.022	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.40	0.064	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	2.1	0.66	Naphthalene	0.23	0.043
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	030921-Ed2	Client:	EMB Consulting
Date Received:	03/10/21	Project:	McCollum Park, F&BI 103177
Date Collected:	03/09/21	Lab ID:	103177-06
Date Analyzed:	03/16/21	Data File:	031527.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.2	0.44	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	0.17	0.079	Bromodichloromethane	<0.067	<0.01
Butane	5.8	2.4	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	13	6.8	Toluene	<19	<5
Acrolein	<2.1	<0.9	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	1.2	0.28
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.15	0.030	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.081	0.020	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.40	0.064	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	0.89	0.28	Naphthalene	0.089 j	0.017 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	EMB Consulting
Date Received:	Not Applicable	Project:	McCollum Park, F&BI 103177
Date Collected:	Not Applicable	Lab ID:	01-546 mb
Date Analyzed:	03/15/21	Data File:	031511.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	<0.49	<0.1	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<2.4	<1	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	<2.1	<0.9	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	<0.049	<0.01	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	<0.31	<0.05	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.057 j	<0.011 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.21	<0.02

Date of Report: 03/19/21
Date Received: 03/10/21
Project: McCollum Park, F&BI 103177

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 103161-01 1/5.0 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Propene	ug/m3	<6	<6	nm
Dichlorodifluoromethane	ug/m3	<2.5	<2.5	nm
Chloromethane	ug/m3	<19	<19	nm
F-114	ug/m3	<3.5	<3.5	nm
Vinyl chloride	ug/m3	<1.3	<1.3	nm
1,3-Butadiene	ug/m3	<0.22	<0.22	nm
Butane	ug/m3	<12	<12	nm
Bromomethane	ug/m3	<12	<12	nm
Chloroethane	ug/m3	<13	<13	nm
Vinyl bromide	ug/m3	<2.2	<2.2	nm
Ethanol	ug/m3	<38	<38	nm
Acrolein	ug/m3	<10	<10	nm
Pentane	ug/m3	<15	<15	nm
Trichlorofluoromethane	ug/m3	<11	<11	nm
Acetone	ug/m3	<24	<24	nm
2-Propanol	ug/m3	<43	<43	nm
1,1-Dichloroethene	ug/m3	<2	<2	nm
trans-1,2-Dichloroethene	ug/m3	<2	<2	nm
Methylene chloride	ug/m3	<170	<170	nm
t-Butyl alcohol (TBA)	ug/m3	<61	<61	nm
3-Chloropropene	ug/m3	<7.8	<7.8	nm
CFC-113	ug/m3	<3.8	<3.8	nm
Carbon disulfide	ug/m3	<31	<31	nm
Methyl t-butyl ether (MTBE)	ug/m3	<9	<9	nm
Vinyl acetate	ug/m3	<35	<35	nm
1,1-Dichloroethane	ug/m3	<2	<2	nm
cis-1,2-Dichloroethene	ug/m3	<2	<2	nm
Hexane	ug/m3	<18	<18	nm
Chloroform	ug/m3	<0.24	<0.24	nm
Ethyl acetate	ug/m3	<36	<36	nm
Tetrahydrofuran	ug/m3	<1.5	<1.5	nm
2-Butanone (MEK)	ug/m3	<15	<15	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.2	<0.2	nm
1,1,1-Trichloroethane	ug/m3	<2.7	<2.7	nm
Carbon tetrachloride	ug/m3	<1.6	<1.6	nm
Benzene	ug/m3	<1.6	<1.6	nm
Cyclohexane	ug/m3	<34	<34	nm
1,2-Dichloropropane	ug/m3	<1.2	<1.2	nm
1,4-Dioxane	ug/m3	<1.8	<1.8	nm
2,2,4-Trimethylpentane	ug/m3	<23	<23	nm

Date of Report: 03/19/21
Date Received: 03/10/21
Project: McCollum Park, F&BI 103177

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 103161-01 1/5.0 (Duplicate) (continued)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Methyl methacrylate	ug/m3	<20	<20	nm
Heptane	ug/m3	<20	<20	nm
Bromodichloromethane	ug/m3	<0.34	<0.34	nm
Trichloroethene	ug/m3	<0.54	<0.54	nm
cis-1,3-Dichloropropene	ug/m3	<2.3	<2.3	nm
4-Methyl-2-pentanone	ug/m3	<20	<20	nm
trans-1,3-Dichloropropene	ug/m3	<2.3	<2.3	nm
Toluene	ug/m3	<94	<94	nm
1,1,2-Trichloroethane	ug/m3	<0.27	<0.27	nm
2-Hexanone	ug/m3	<20	<20	nm
Tetrachloroethene	ug/m3	<34	<34	nm
Dibromochloromethane	ug/m3	<0.43	<0.43	nm
1,2-Dibromoethane (EDB)	ug/m3	<0.38	<0.38	nm
Chlorobenzene	ug/m3	<2.3	<2.3	nm
Ethylbenzene	ug/m3	<2.2	<2.2	nm
1,1,2,2-Tetrachloroethane	ug/m3	<0.69	<0.69	nm
Nonane	ug/m3	<26	<26	nm
Isopropylbenzene	ug/m3	<12	<12	nm
2-Chlorotoluene	ug/m3	<26	<26	nm
Propylbenzene	ug/m3	<12	<12	nm
4-Ethyltoluene	ug/m3	<12	<12	nm
m,p-Xylene	ug/m3	<4.3	<4.3	nm
o-Xylene	ug/m3	<2.2	<2.2	nm
Styrene	ug/m3	<4.3	<4.3	nm
Bromoform	ug/m3	<10	<10	nm
Benzyl chloride	ug/m3	<0.26	<0.26	nm
1,3,5-Trimethylbenzene	ug/m3	<12	<12	nm
1,2,4-Trimethylbenzene	ug/m3	<12	<12	nm
1,3-Dichlorobenzene	ug/m3	<3	<3	nm
1,4-Dichlorobenzene	ug/m3	<1.1	<1.1	nm
1,2-Dichlorobenzene	ug/m3	<3	<3	nm
1,2,4-Trichlorobenzene	ug/m3	<3.7	<3.7	nm
Naphthalene	ug/m3	<1.3	<1.3	nm
Hexachlorobutadiene	ug/m3	<1.1	<1.1	nm

Date of Report: 03/19/21
Date Received: 03/10/21
Project: McCollum Park, F&BI 103177

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Propene	ug/m3	23	91	70-130
Dichlorodifluoromethane	ug/m3	67	102	70-130
Chloromethane	ug/m3	28	100	70-130
F-114	ug/m3	94	102	70-130
Vinyl chloride	ug/m3	35	98	70-130
1,3-Butadiene	ug/m3	30	99	70-130
Butane	ug/m3	32	108	70-130
Bromomethane	ug/m3	52	109	70-130
Chloroethane	ug/m3	36	104	70-130
Vinyl bromide	ug/m3	59	110	70-130
Ethanol	ug/m3	25	103	70-130
Acrolein	ug/m3	31	106	70-130
Pentane	ug/m3	40	106	70-130
Trichlorofluoromethane	ug/m3	76	104	70-130
Acetone	ug/m3	32	103	70-130
2-Propanol	ug/m3	33	90	70-130
1,1-Dichloroethene	ug/m3	54	100	70-130
trans-1,2-Dichloroethene	ug/m3	54	101	70-130
Methylene chloride	ug/m3	94	90	70-130
t-Butyl alcohol (TBA)	ug/m3	41	95	70-130
3-Chloropropene	ug/m3	42	98	70-130
CFC-113	ug/m3	100	102	70-130
Carbon disulfide	ug/m3	42	105	70-130
Methyl t-butyl ether (MTBE)	ug/m3	49	99	70-130
Vinyl acetate	ug/m3	48	87	70-130
1,1-Dichloroethane	ug/m3	55	101	70-130
cis-1,2-Dichloroethene	ug/m3	54	100	70-130
Hexane	ug/m3	48	97	70-130
Chloroform	ug/m3	66	101	70-130
Ethyl acetate	ug/m3	49	100	70-130
Tetrahydrofuran	ug/m3	40	102	70-130
2-Butanone (MEK)	ug/m3	40	95	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	100	70-130
1,1,1-Trichloroethane	ug/m3	74	101	70-130
Carbon tetrachloride	ug/m3	85	100	70-130
Benzene	ug/m3	43	100	70-130
Cyclohexane	ug/m3	46	104	70-130
1,2-Dichloropropane	ug/m3	62	102	70-130
1,4-Dioxane	ug/m3	49	101	70-130
2,2,4-Trimethylpentane	ug/m3	63	104	70-130

Date of Report: 03/19/21
Date Received: 03/10/21
Project: McCollum Park, F&BI 103177

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample (continued)

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Methyl methacrylate	ug/m3	55	98	70-130
Heptane	ug/m3	55	101	70-130
Bromodichloromethane	ug/m3	90	100	70-130
Trichloroethene	ug/m3	73	100	70-130
cis-1,3-Dichloropropene	ug/m3	61	98	70-130
4-Methyl-2-pentanone	ug/m3	55	99	70-130
trans-1,3-Dichloropropene	ug/m3	61	102	70-130
Toluene	ug/m3	51	101	70-130
1,1,2-Trichloroethane	ug/m3	74	104	70-130
2-Hexanone	ug/m3	55	103	70-130
Tetrachloroethene	ug/m3	92	104	70-130
Dibromochloromethane	ug/m3	120	100	70-130
1,2-Dibromoethane (EDB)	ug/m3	100	99	70-130
Chlorobenzene	ug/m3	62	100	70-130
Ethylbenzene	ug/m3	59	100	70-130
1,1,2,2-Tetrachloroethane	ug/m3	93	99	70-130
Nonane	ug/m3	71	104	70-130
Isopropylbenzene	ug/m3	66	101	70-130
2-Chlorotoluene	ug/m3	70	104	70-130
Propylbenzene	ug/m3	66	104	70-130
4-Ethyltoluene	ug/m3	66	101	70-130
m,p-Xylene	ug/m3	120	101	70-130
o-Xylene	ug/m3	59	102	70-130
Styrene	ug/m3	58	104	70-130
Bromoform	ug/m3	140	100	70-130
Benzyl chloride	ug/m3	70	88	70-130
1,3,5-Trimethylbenzene	ug/m3	66	102	70-130
1,2,4-Trimethylbenzene	ug/m3	66	103	70-130
1,3-Dichlorobenzene	ug/m3	81	104	70-130
1,4-Dichlorobenzene	ug/m3	81	92	70-130
1,2-Dichlorobenzene	ug/m3	81	100	70-130
1,2,4-Trichlorobenzene	ug/m3	100	96	70-130
Naphthalene	ug/m3	71	103	70-130
Hexachlorobutadiene	ug/m3	140	102	70-130

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

103177

SAMPLE CHAIN OF CUSTODY MO 03-10-21

Report To Elisabeth Black

Company EMB Consulting

Address 22725 44th Ave W. #203

City, State, ZIP Mountlake Terrace, WA 98043

Phone 206.915.2395 Email emblackconsulting@gmail.com

SAMPLERS (*signature*) E. Black

PROJECT NAME & ADDRESS: McCollum Park

PO #:

NOTES:

INVOICE TO:

TURNAROUND TIME
- [x] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION

Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium		Notes
030921-Pool1	01	18576	F5349	(IA) / SG	03-09-21 03-10-21	29.25	09:05	9.75	07:54	X						
030921-Pool2	02	32100	F5347	(IA) / SG	"	>30	09:08	11.5	07:58	X						
030921-WSU1	03	23233	05354	(IA) / SG	"	28.0	09:22	9.0	08:11	X						
030921-WSU2	04	18566	07848	(IA) / SG	"	>30	09:29	7.0	08:07	X						
030921-Ed1	05	18562	06602	(IA) / SG	"	29.0	09:35	9.0	08:22	X						
030921-Ed2	06	18579	07852	(IA) / SG	"	>30	09:40	6.25	08:25	X						
				IA / SG												
				IA / SG												Samples received at 19 °C

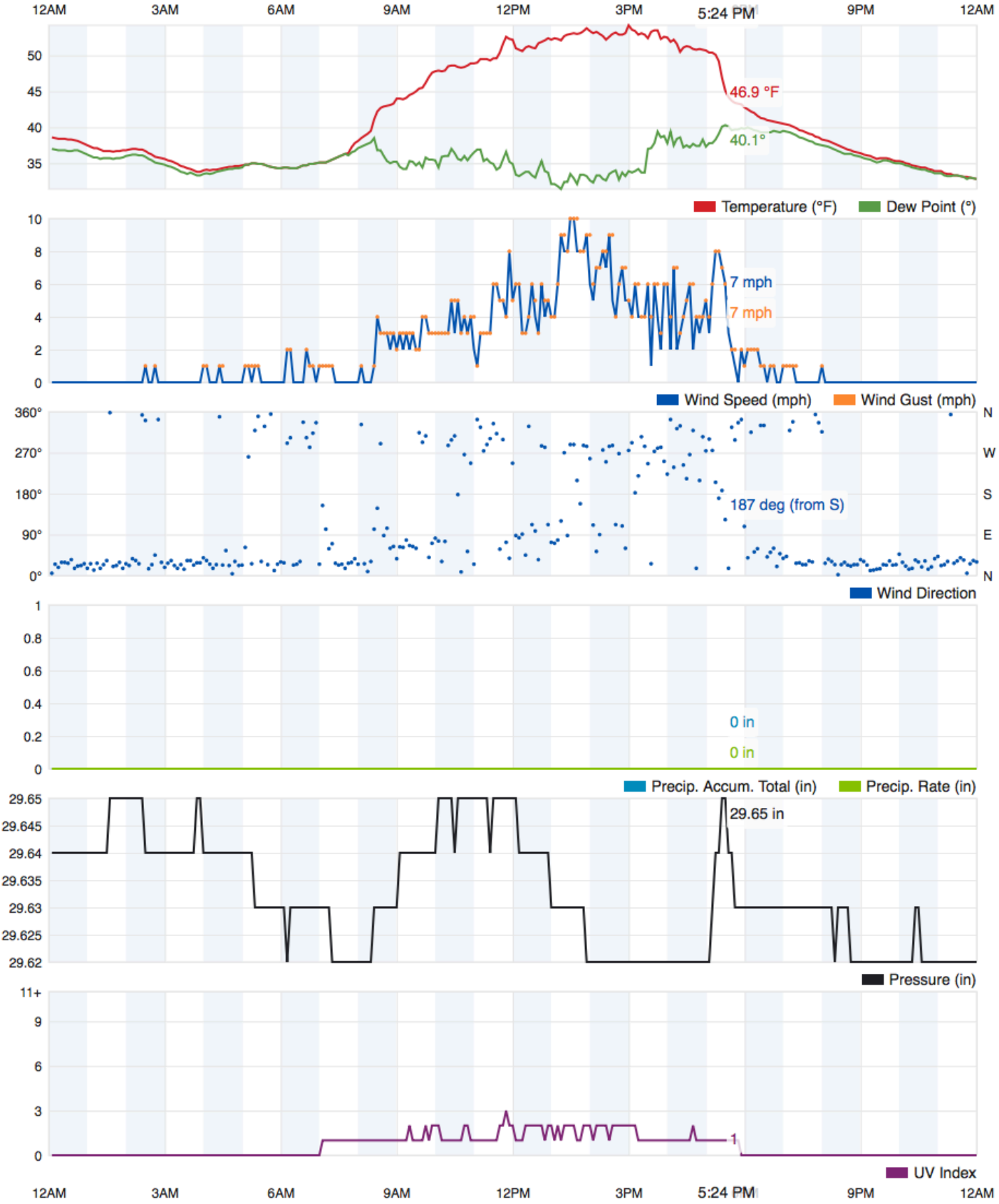
ANALYSIS REQUESTED

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: E. Black	Elisabeth Black	EMB Consulting	03.10.21	10:30
Received by: Nhan Pham	Nhan Pham	FEBI	3/10/21	10:30
Relinquished by:				
Received by:				

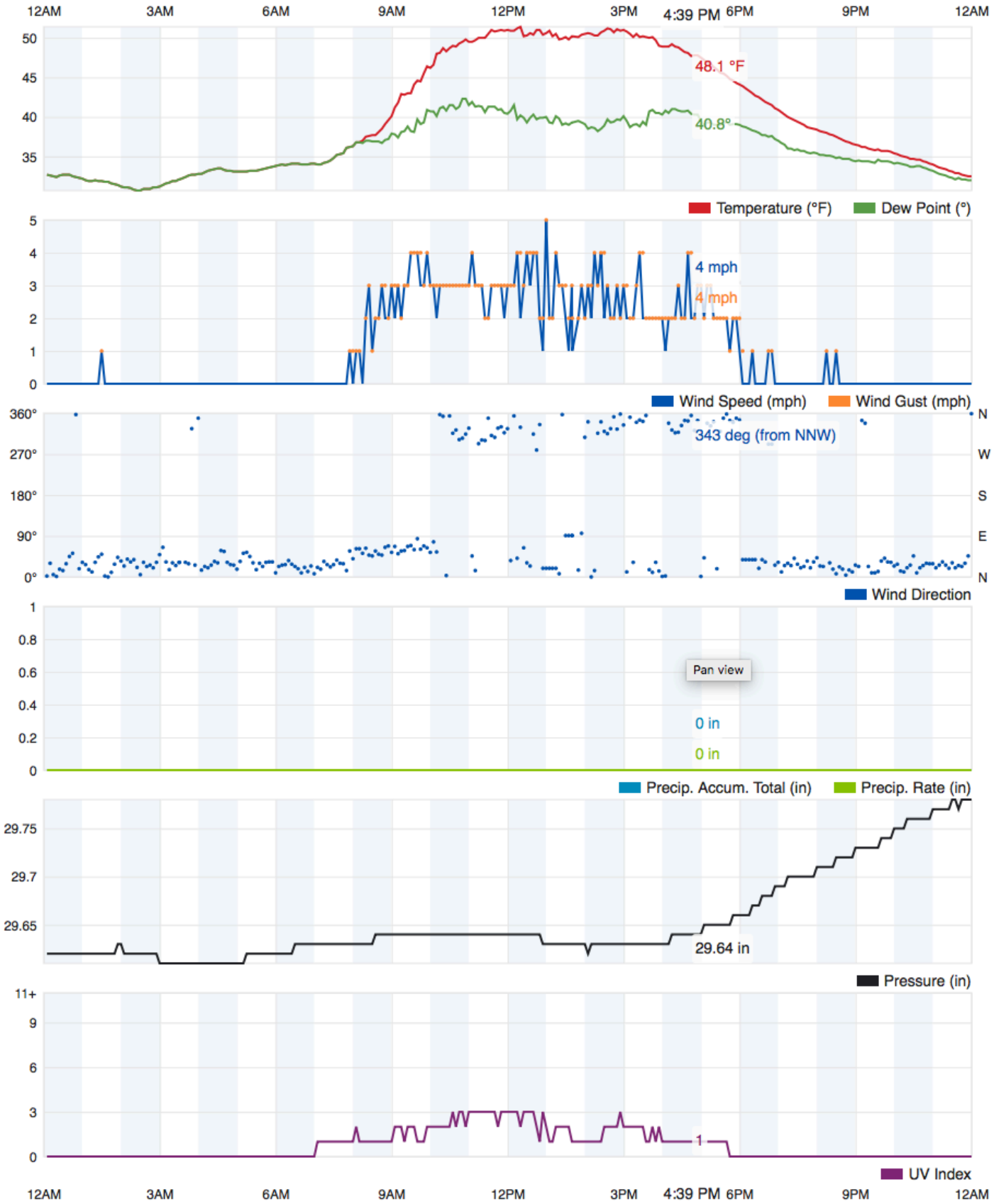
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

ATTACHMENT B
Weather Data Summary
WeatherUnderground
Station KWAEVERE204
Everett, Washington
March 9 & 10, 2021

March 9, 2021


12AM
3AM
6AM
9AM
12PM
3PM
5:24 PM
9PM
12AM
50
45
40
35
46.9 °F
40.1°
Temperature (°F)
Dew Point (°)
10
8
6
4
2
0
7 mph
7 mph
Wind Speed (mph)
Wind Gust (mph)
360°
270°
180°
90°
0°
N
W
S
E
N
187 deg (from S)
Wind Direction
1
0.8
0.6
0.4
0.2
0
0 in
0 in
Precip. Accum. Total (in)
Precip. Rate (in)
29.65
29.645
29.64
29.635
29.63
29.625
29.62
29.65 in
Pressure (in)
11+
9
6
3
0
1
UV Index
12AM
3AM
6AM
9AM
12PM
3PM
5:24 PM
9PM
12AM

March 10, 2021



This Page Intentionally Left Blank

Appendix C

Aspect Consulting - Draft Tier II Assessment Report, McCollum Park Site

TIER II ASSESSMENT REPORT

McCollum Park Site

Prepared for: Snohomish County

Project No. 210222 • June 4, 2021 DRAFT

Aspect CONSULTING

earth + water

TIER II ASSESSMENT REPORT
McCollum Park Site

Prepared for: Snohomish County

Project No. 210222 • June 4, 2021 DRAFT

Aspect Consulting, LLC

PRELIMINARY

Delia Massey, PE
Project Engineer
dmassey@aspectconsulting.com

Peter Bannister, PE
Sr. Associate Engineer
pbannister@aspectconsulting.com

V:\210222 McCollum Park VI Investigation\Deliverables\VI Tier 2 Report\DRAFT\Tier 2 Report_DRAFT_2021.06.04.docx

Contents

List of Tables

List of Figures

List of Appendices

This Page Intentionally Left Blank

1 Introduction

This report documents air quality monitoring Aspect Consulting, LLC (Aspect) conducted at selected buildings at the McCollum Park site (Site) located at 600 128th Street SE in Everett, Washington, on April 26 and 27, 2021. Monitoring was conducted under Tier II of the Washington State Department of Ecology (Ecology) 2018 Vapor Intrusion Guidance. Tier II addresses building-specific monitoring for contaminants of concern (COCs) in specific media, including indoor air, ambient air, and sub-slab soil gas. The purpose of Tier II assessment is to evaluate whether indoor air is being unacceptably impacted by vapor intrusion (VI). The Site location is shown on Figure 1. Site features, including the building locations at McCollum Park, are shown on Figure 2.

Snohomish County (County) developed McCollum Park in 1996 as part of cleanup activities at the closed Emander Landfill (landfill) conducted under Agreed Order 96 TC-N126 with Ecology. Landfill gas collection and compliance monitoring and confirmation groundwater monitoring is ongoing as part of the Site cleanup under the Model Toxics Control Act (MTCA). The County conducted a preliminary VI assessment (EMB, 2021) that identified a set of contaminants inside buildings that exceeded MTCA Method B indoor air cleanup levels.

The County contacted Aspect to conduct further investigations, and Aspect developed the VI Work Plan to conduct the Tier II VI Assessment (Aspect, 2021). Aspect performed the work on behalf of Snohomish County Parks and Recreation. Monitoring was conducted in accordance with the Site-specific Vapor Intrusion Evaluation Work Plan (VI Work Plan; Aspect, 2021).

1.1 Background

The following background is based on information in documents related to the MTCA cleanup action. A portion of McCollum Park was constructed on the former Emander Landfill, which extended beneath 128th Street SE to the north, across Dumas Road to the east, and was bordered by North Creek to the west and wooded park land to the south. The approximate extent of the former Emander Landfill is shown on Figure 2. The County acquired the landfill property in 1922, and it was initially used as a gravel mine in 1929. From 1947 to 1967, the Emander Landfill property was used for refuse disposal. A soil cover was installed after the completion of landfill operations in 1967. The Site was then turned over to the Snohomish County Parks and Recreation Department for development as McCollum Park. The northern part of the park was developed into a Park and Ride, located at 620 128th Street SE.

McCollum Park was improved as part of the County's Master Plan Implementation in 1993, after an Environmental Impact Statement identified potential environmental impacts from landfill gas and landfill contents encountered during environmental investigations. During cleanup activities, the landfill was characterized as containing

municipal solid waste and several areas of sludge containing petroleum hydrocarbons, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and metals.

Cleanup actions in 1996 included placing additional fill soil over the landfill, installing a composite cover system to limit precipitation infiltration through landfill materials, operating a landfill gas management system (perimeter and interior) to control potential migration, and conducting long-term groundwater compliance monitoring.

1.2 Site/Building Description

Five buildings at McCollum Park were included in the VI assessment and are described below. A building evaluation and Site walk was conducted on April 16, and the results are included in the VI Work Plan (Aspect, 2021).

1.2.1 McCollum Park Pool Building

The pool building is a commercial building occupied by pool staff and visitors during the summer months. The building is vacant during the winter months when the pool is not open. The first-floor plans of this slab-on-grade structure are shown in Appendix A. According to County Assessor information (Parcel No. 28053000302100), the building was constructed in 1969 and has a total floor space of 2,699 square feet. The building consists of one story that contains a lobby, break room, office, and men's and women's locker rooms. Additional structures attached to the outside of the building include a pool chemical storage room, a boiler room, and a laundry/storage room. There is no HVAC system, and ventilation is provided by opening windows and doors. There is a natural gas heating unit in the office that heats the lobby.

1.2.2 WSU Extension Building

The Washington State University (WSU) Extension building is a commercial building occupied by WSU staff year-round during normal business hours. The first-floor plans of this slab-on-grade structure are shown in Appendix A. According to County Assessor information (Parcel No. 28053100200200), the building was constructed in 1980 and has a total floor space of 4,500 square feet. The building consists of one story that contains offices, a kitchen, and bathrooms. There is no HVAC system, and ventilation is provided by window air conditioning units or by opening windows and doors. Heating is provided by electric baseboard heaters.

1.2.3 WSU Education Building

The WSU Education building is a commercial building occupied by WSU staff and students year-round during normal business hours. The first-floor plans of this slab-on-grade structure are shown in Appendix A. According to County Assessor information (Parcel No. 28053100200200), the building was constructed in 1980 and has a total floor space of 6,300 square feet. The building was previously used for vehicle maintenance, based on a discussion with Jeremy Husby. The building consists of one story that contains classrooms, offices, a computer lab, bathrooms, and a storage room. There is no HVAC system, and ventilation is provided by window air conditioning units or by opening windows and doors. Heating is provided by electric baseboard heaters.

1.2.4 McCollum BMX Building

The BMX building is a commercial building occupied only during BMX race events. Floor plans were not available; however, the approximate floor space is 336 square feet. The building consists of one story that contains a room for race registration and concessions. There is no HVAC system, and ventilation is provided by large open windows on both sides of the building.

1.2.5 Adopt-a-Stream Building

The Adopt-a-Stream Foundation building is a commercial building occupied by staff and visitors year-round during normal business hours. The first-floor and second-floor plans of this slab-on-grade structure are shown in Appendix A. According to County Assessor information (Parcel No. 28053100200201), the building was constructed in 1996 and has a total floor space of 7,752 square feet. The building consists of two stories that contain a gift shop, auditorium, break room, offices, bathrooms, and a kitchen. There are three different HVAC systems for the three parts of the building (eastern, central, and western sections). Heating is provided by a recently updated electrical system in the eastern end (ecologist break/gear room, office), and separate propane units in the central (auditorium) and western end (gift shop, kitchen, office) from the original building construction. According to a conversation with Tom Murdoch, there is believed to be a vapor barrier installed under the building; however, the construction records have been destroyed, and the vapor barrier specifications are unknown. Mr. Murdoch also reported that the auditorium slab was sealed with epoxy after construction.

2 Description of Sampling Events

2.1 Indoor Air Sampling

Aspect conducted one round of indoor air sampling, on April 26, 2021. Sampling locations were consistent with the VI Work Plan (see Figure 3) and are listed in Table 1 below. Ambient air sampling locations were all outside and upwind of the building. The ambient air sample for the Adopt-a-Stream building was collected from the outlet of the HVAC system. The HVAC systems in the western and central portions of the Adopt-a-Stream building were off during the sampling event, and the forced hot air was on in the eastern portion of the building.

Table 1. Sampling Locations and Sample Names

Building/Location	*Type of Sample*		
	Indoor Air	**Ambient Air**	**Sub-slab Soil Gas**
McCollum Park Pool		**POOL-AA**	
Office	**POOL-1-IA**		**POOL-1-SG**
Lobby	**POOL-2-IA**		**POOL-2-SG**
WSU Extension Building		**WSU-AA**	
Northeast Office	**WSU-EX1-IA**		**WSU-EX1-SG**
Southwest Office	**WSU-EX2-IA**		**WSU-EX2-SG**
WSU Education Building			
Cougar Classroom	**WSU-ED1-IA**		**WSU-ED1-SG**
Evergreen Classroom	**WSU-ED2-IA**		**WSU-ED2-SG**
McCollum BMX Building		**BMX-AA**	
Open Space	**BMX-1-IA**		**BMX-1-SG**
Adopt-a-Stream Building		**STREAM-AA**	
Ecologist Break/Gear Room (Eastern End)	**STREAM-1-IA**		
Auditorium	**STREAM-2-IA**		
Gift Shop (Western End)	**STREAM-3-IA**		

Air sampling was conducted in accordance with the procedures for indoor air and ambient air provided in the VI Work Plan. The samples were collected in 6-liter Summa canisters that were individually certified "clean" by Friedman & Bruya, Inc. (F&BI), a certified analytical laboratory in Seattle, Washington. Each canister was outfitted with a 0.2-micrometer (µm) filter, a vacuum gauge, and an 8-hour flow controller. The canister vacuum readings at the start and finish of sampling are provided in the field forms (Appendix B) and listed in Table 2 along with observed landfill gas concentrations. Ambient weather conditions leading up to the sampling dates, as recorded at a weather station approximately 1.3 miles from McCollum Park (Citizen Weather Observer Program Station ID DW3008) are provided graphically below. Barometric pressure was slowly rising during sample collection and was at or below the average barometric pressure for month previous.

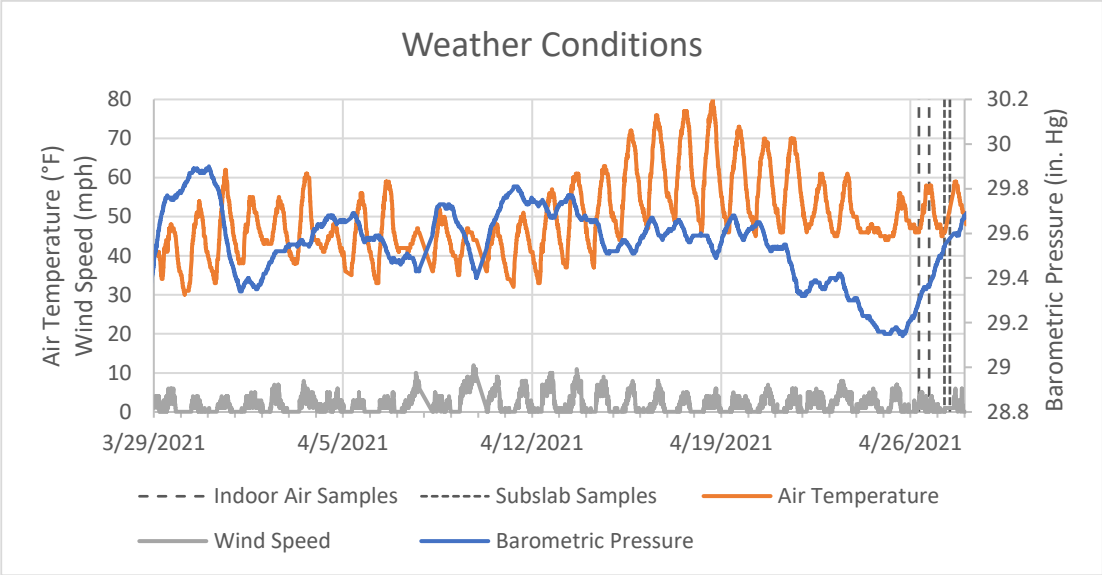


Figure 4. Weather Conditions prior to Sampling

2.2 Sub-slab Soil Gas Sampling

Aspect conducted one round of sub-slab soil gas sampling, on April 27, 2021. Sampling locations were consistent with the VI Work Plan and are shown on Figure 3, and are listed in Table 1. Photos of the restored sampling locations are included in Appendix C. The sub-slab soil gas sample associated with the northeast office in the WSU Extension building was placed in the computer closet, per the request of the client. Based on the proximity of these locations in the slab, this should not affect the results. The sub-slab soil gas samples were collected in accordance with the procedures provided in the VI Work Plan. No helium was detected in the sub-slab samples, indicating that there was no leakage through the sampling ports. Barometric pressure was rising during sub-slab soil gas samples and was close to the average condition during the previous month (Figure 3). Therefore, samples were likely representative of soil gas and not likely diluted by atmospheric air.

3 Sampling Results

The sample canisters were shipped to F&BI for analysis of air-phase hydrocarbons (APHs) by the Massachusetts State Department of Environmental Protection APH (MA-APH) method and VOCs using U.S. Environmental Protection Agency (EPA) Method TO-15. Low-level analysis or Selective Ion Mode (SIM) analysis was used where possible to obtain the lowest achievable detection and reporting limits.

Sampling results summarized in Table 3 show ambient air, indoor air, and soil gas concentrations. Where an analyte was not detected at the reporting limit, the result is

shown as less than (<) the reporting limit and flagged "U." The full laboratory reports are provided in Appendix D. Results in Table 3 are color coded to indicate exceedances of either the MTCA Method B indoor air cleanup level or the sub-slab soil gas screening level. In many cases, the reporting limit was above these standards.

Following Ecology guidance, indoor air results were corrected for background contributions of contamination by subtracting out the ambient air results associated with the building, and are listed in Table 3. The following COCs had detected results exceeding the MTCA Method B indoor air cleanup level after correction for ambient air:

- Total Petroleum Hydrocarbons (Pool Lobby and Office, and WSU Education Evergreen Classroom)
- Benzene (Pool Lobby and Office, and WSU Education Evergreen and Cougar Classrooms)
- Naphthalene (Pool Lobby and Office, Adopt-a-Stream Break Room and Auditorium, and WSU Education Evergreen and Cougar Classrooms)
- 1,2-Dichloroethane (WSU Extension Northeast Office)
- 1,4-Dichlorobenzene (Pool Lobby and Office)
- Acrolein (all sampling locations)
- Chloroform (WSU Extension Southwest Office)

The following COCs had detected results exceeding the MTCA Method B soil gas screening levels:

- Acrolein (Pool Office and WSU Education Cougar Classroom)
- Chloroform (Pool Office)

4 Conclusions and Recommendations

Overall, the results of the Tier II assessment indicate indoor air cleanup level exceedances did not correspond with sub-slab soil gas screening levels. This suggests that the source of the indoor air contamination is not likely due to VI from the former landfill. In addition, no methane and low carbon dioxide concentrations indicated little to no landfill gas in the sub-slab soil gas monitoring points (Table 2). The sources of the contaminants exceeding the indoor air cleanup levels are generally ambient air and/or are located within the buildings themselves.

Sub-slab samples were not collected from the Adopt-A-Stream building due to the risk of penetrating a vapor barrier. However, sub-slab soil gas concentrations observed at the WSU Extension and Education buildings, located closer to the potential landfill source, indicated little to no source of VI.

A discussion of the corrected indoor air exceedances is shared below, with a list of potential sources for each contaminant.

- Total petroleum hydrocarbons were found at the Pool building (lobby and office) and WSU Education building (Evergreen Classroom). Common sources of petroleum hydrocarbons are gasoline and diesel. At the WSU Education building, this could be attributed to the former building use of vehicle maintenance.
- Benzene was found at the Pool building in the lobby and office, and both of the WSU Education building classrooms. Common sources of benzene are tobacco smoke, gasoline vapors, vehicle exhaust, and household products (glues, paints, furniture wax, and lubricants).
- Naphthalene exceedances were identified at the Pool building (lobby and office), Adopt-a-Stream building (auditorium and break room), and both WSU Education building classrooms. Common sources of naphthalene are mothballs, insecticide, paint, varnish, tobacco smoke, and air fresheners/deodorizers.
- 1,2-Dichloroethane was found at the WSU Extension building (northeast office). Common sources of this contaminant include gasoline vehicle exhaust and tobacco smoke.
- 1,4-Dichlorobenzene exceedances were identified at the Pool building (lobby and office). Common sources of this contaminant include fumigants for moths, mold, and mildew, and air fresheners/deodorizers.
- Acrolein exceedances were identified at all indoor air sample locations and in soil gas at the Pool building (office) and WSU Education building (Cougar Classroom). Common sources of acrolein include tobacco smoke, vehicle exhaust, and cooking (fried foods, oils, and roasted coffee).
- Chloroform was found in indoor air at the WSU Extension building (southwest office) and soil gas at the Pool building (office). Common sources of chloroform include chlorinated water and cleaning products, such as bleach.

While the results do not indicate that there is a VI risk in the buildings at McCollum Park, there are elevated indoor air concentrations of COCs. The Ecology guidance recommends resampling and investigation of potential indoor sources when there are exceedances of the indoor air cleanup level, but no exceedances of the sub-slab soil gas screening level.

References

Aspect Consulting, LLC (Aspect), 2021, Vapor Intrusion Evaluation Work Plan, McCollum Park Site, Everett, Washington, April 23, 2021. Aspect, 2021.

EMB Consulting, LLC (EMB), 2021, Preliminary Vapor Intrusion Assessment, McCollum Pioneer Park, Everett, Washington, April 1, 2021. EMB, 2021.

Washington State Department of Ecology (Ecology), 2018, Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, dated October 2009, Revised February 2016 and April 2018.

Limitations

Work for this project was performed for Snohomish County (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix E titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

This Page Intentionally Left Blank

TABLES

Table 2. Sampling Summary

Project No. 210222, McCollum Park Site, Everett Washington

Sampling Date	April 26, 2021													
Sample Type	Indoor Air	Indoor Air	Ambient Air	Indoor Air	Indoor Air	Indoor Air	Indoor Air	Ambient Air	Indoor Air	Ambient Air	Indoor Air	Indoor Air	Indoor Air	Ambient Air
Building	Pool Building			WSU Education Building		WSU Extension Building		WSU Buildings	BMX Building		Adopt-a-Stream Building			
Sample ID	POOL-1-IA	POOL-2-IA	POOL-AA	WSU-ED1-IA	WSU-ED2-IA	WSU-EX1-IA	WSU-EX2-IA	WSU-AA	BMX-1-IA	BMX-AA	STREAM-1-IA	STREAM-2-IA	STREAM-3-IA	STREAM-AA
Sampling Location (Refer to Figure 3)	Office	Lobby	Pool Deck	Cougar Classroom	Evergreen Classroom	Northeast Office	Southwest Office	Between WSU buildings	Office	Outside	Ecologist break/gear room	Auditorium	Gift Shop	Auditorium HVAC outlet
Canister Vacuum in inches of mercury (in. Hg)														
Start-of-Sampling	30	29	28.5	31	29	30	29	31	29	29	29	30	28	30
End-of-Sampling	7	6	8	9	6	9	8.5	7	6	6	7.5	5	8	9
Landfill Gas Measurements														
CH_4 (% volume)	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
CO_2 (% volume)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
O_2 (% volume)	20.6	20.6	20.7	20.7	20.9	20.7	20.7	20.6	20.7	20.7	20.7	20.7	20.7	21.0
H_2S (% volume)	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

Sampling Date	April 27, 2021						
Sample Type	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Building	Pool Building		WSU Education Building		WSU Extension Building		BMX Building
Sample ID	POOL-1-SG	POOL-2-SG	WSU-ED1-SG	WSU-ED2-SG	WSU-EX1-SG	WSU-EX2-SG	BMX-1-SG
Sampling Location (Refer to Figure 3)	Office	Lobby	Cougar Classroom	Evergreen Classroom	Northeast Office	Southwest Office	Office
Canister Vacuum in inches of mercury (in. Hg)							
Start-of-Sampling	29	29	30	29	29	29	30
End-of-Sampling	5	5	5	5	5	5	5
Landfill Gas Measurements							
CH_4 (% volume)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO_2 (% volume)	0.6	0.4	0.0	0.0	0.4	0.7	0.2
O_2 (% volume)	18.6	19.8	20.2	20.2	19.8	19.5	20.0
H_2S (% volume)	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 3. Vapor Analytical Results

Project No. 210222, McCollum Park Site, Everett, Washington

				BMX Building				Pool Building						
			Location	BMX-1-SG	BMX-1-IA	BMX-1-IA (corrected)	BMX-AA	POOL-1-SG	POOL-1-IA	POOL-1-IA (corrected)	POOL-2-SG	POOL-2-IA	POOL-2-IA (corrected)	POOL-AA
			Date	04/27/2021	04/26/2021		04/26/2021	04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/26/2021
Analyte	Unit	Indoor Air Cleanup Level - MTCA Method B	Sub-Slab Soil Gas Screening Level - MTCA Method B											
APH														
C5 - C8 Aliphatic Hydrocarbons	ug/m3			**560**	**130**	**20**	**110**	**800**	**390**	**270**	**890**	**370**	**250**	**120**
C9 - C12 Aliphatic Hydrocarbons	ug/m3			< 130 U	< 25 U	ND	< 25 U	**260**	**36**	**11**	**280**	**25**	**0**	< 25 U
C9 - C10 Aromatic Hydrocarbons	ug/m3			< 130 U	< 25 U	ND	< 25 U	< 140 U	< 25 U	ND	< 140 U	< 25 U	ND	< 25 U
Total Petroleum Hydrocarbons (ND = 1/2 RL	ug/m3	140	4700	**745**	**166**	**20**	**146**	**1200**	**485**	**329**	**1310**	**454**	**298**	**156**
BTEX														
Benzene	ug/m3	0.32	11	< 1.7 U	< 0.32 U	ND	< 0.32 U	**2.8**	**3.6**	**3.3**	< 1.8 U	**3.7**	**3.4**	< 0.32 U
Toluene	ug/m3	2300	76000	< 98 U	< 19 U	ND	< 19 U	< 110 U	**29**	**10**	< 100 U	**28**	**9**	< 19 U
Ethylbenzene	ug/m3	460	15000	< 2.3 U	< 0.43 U	ND	< 0.43 U	< 2.4 U	**2.2**	**1.8**	< 2.4 U	**2.3**	**1.9**	< 0.43 U
Total Xylenes	ug/m3	46	1500	< 4.5 U	< 0.87 U	ND	< 0.87 U	**11.6**	**11.6**	**10.7**	**12.2**	**12.2**	**11.3**	< 0.87 U
Other SVOCs														
1,4-Dioxane	ug/m3	0.5	17	< 1.9 U	< 0.36 U	ND	< 0.36 U	< 2 U	< 0.36 U	ND	< 2 U	< 0.36 U	ND	< 0.36 U
Hexachlorobutadiene	ug/m3	0.11	3.8	< 2.8 U	< 0.53 U	ND	< 0.53 U	< 3 U	< 0.53 U	ND	< 3 U	< 0.53 U	ND	< 0.53 U
PAHs														
Naphthalene	ug/m3	0.073	2.5	< 1.4 U	**0.079 J**	**0.022**	< 0.057 UJ	< 1.5 U	**0.57**	**0.481**	< 1.4 U	**0.55**	**0.461**	**0.089 J**
VOCs														
1,1,1-Trichloroethane	ug/m3	2300	76000	< 2.8 U	< 0.55 U	ND	< 0.55 U	< 3.1 U	< 0.55 U	ND	< 3 U	< 0.55 U	ND	< 0.55 U
1,1,2,2-Tetrachloroethane	ug/m3	0.043	1.4	< 0.71 U	< 0.14 U	ND	< 0.14 U	< 0.77 U	< 0.14 U	ND	< 0.76 U	< 0.14 U	ND	< 0.14 U
1,1,2-Trichloroethane	ug/m3	0.091	3	< 0.28 U	< 0.055 U	ND	< 0.055 U	< 0.31 U	< 0.055 U	ND	< 0.3 U	< 0.055 U	ND	< 0.055 U
1,1,2-Trichlorotrifluoroethane	ug/m3	2300	76000	< 4 U	< 0.77 U	ND	< 0.77 U	< 4.3 U	< 0.77 U	ND	< 4.2 U	< 0.77 U	ND	< 0.77 U
1,1-Dichloroethane	ug/m3	1.6	52	< 2.1 U	< 0.4 U	ND	< 0.4 U	< 2.3 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 0.4 U
1,1-Dichloroethene	ug/m3	91	3000	< 2.1 U	< 0.4 U	ND	< 0.4 U	< 2.2 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 0.4 U
1,2,4-Trichlorobenzene	ug/m3	0.91	30	< 3.9 U	< 0.74 U	ND	< 0.74 U	< 4.2 U	< 0.74 U	ND	< 4.1 U	< 0.74 U	ND	< 0.74 U
1,2,4-Trimethylbenzene	ug/m3	27	910	< 13 U	< 2.5 U	ND	< 2.5 U	< 14 U	**5.7**	**3.2**	< 14 U	**5.7**	**3.2**	< 2.5 U
1,2-Dibromoethane (EDB)	ug/m3	0.0042	0.14	< 0.4 U	< 0.077 U	ND	< 0.077 U	< 0.43 U	< 0.077 U	ND	< 0.42 U	< 0.077 U	ND	< 0.077 U
1,2-Dichlorobenzene	ug/m3	91	3000	< 3.1 U	< 0.6 U	ND	< 0.6 U	< 3.4 U	< 0.6 U	ND	< 3.3 U	< 0.6 U	ND	< 0.6 U
1,2-Dichloroethane (EDC)	ug/m3	0.096	3.2	< 0.21 U	**0.077**	ND	**0.065**	< 0.23 U	**0.077**	**0.004**	< 0.22 U	**0.077**	**0.004**	**0.073**
1,2-Dichloropropane	ug/m3	0.68	23	< 1.2 U	< 0.23 U	ND	< 0.23 U	< 1.3 U	< 0.23 U	ND	< 1.3 U	< 0.23 U	ND	< 0.23 U
1,3,5-Trimethylbenzene	ug/m3	27	910	< 13 U	< 2.5 U	ND	< 2.5 U	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
1,3-Dichlorobenzene	ug/m3			< 3.1 U	< 0.6 U	ND	< 0.6 U	< 3.4 U	< 0.6 U	ND	< 3.3 U	< 0.6 U	ND	< 0.6 U
1,4-Dichlorobenzene	ug/m3	0.23	7.6	< 1.2 U	< 0.23 U	ND	< 0.23 U	< 1.3 U	**1.1**	**0.87**	< 1.3 U	**0.84**	**0.61**	< 0.23 U
1-Propene	ug/m3			< 6.3 U	< 1.2 U	ND	< 1.2 U	< 6.7 U	< 1.2 U	ND	< 6.6 U	< 1.2 U	ND	< 1.2 U
2-Butanone	ug/m3	2300	76000	< 15 U	< 2.9 U	ND	< 2.9 U	< 17 U	< 2.9 U	ND	< 16 U	< 2.9 U	ND	< 2.9 U
2-Chlorotoluene	ug/m3			< 27 U	< 5.2 U	ND	< 5.2 U	< 29 U	< 5.2 U	ND	< 28 U	< 5.2 U	ND	< 5.2 U
2-Hexanone	ug/m3	14	460	< 21 U	< 4.1 U	ND	< 4.1 U	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
4-Methyl-2-pentanone	ug/m3	1400	46000	< 21 U	< 4.1 U	ND	< 4.1 U	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
Acetone	ug/m3	14000	470000	**46**	**9.7**	**3.5**	**6.2**	**380 E**	< 4.8 U	ND	**830 E**	< 4.8 U	ND	**7.2**
Acrolein	ug/m3	0.0091	0.3	< 0.6 U	**0.51**	**0.35**	**0.16**	**1.3**	**0.54**	**0.32**	< 0.63 U	**0.37**	**0.15**	**0.22**
Allyl Chloride	ug/m3	0.42	14	< 8.1 U	< 1.6 U	ND	< 1.6 U	< 8.8 U	< 1.6 U	ND	< 8.6 U	< 1.6 U	ND	< 1.6 U
Bromodichloromethane	ug/m3	0.068	2.3	< 0.35 U	< 0.067 U	ND	< 0.067 U	**1.5**	< 0.067 U	ND	< 0.37 U	< 0.067 U	ND	< 0.067 U
Bromoform	ug/m3	2.3	76	< 11 U	< 2.1 U	ND	< 2.1 U	< 12 U	< 2.1 U	ND	< 11 U	< 2.1 U	ND	< 2.1 U
Bromomethane	ug/m3	2.3	76	< 12 U	< 2.3 U	ND	< 2.3 U	< 13 U	< 2.3 U	ND	< 13 U	< 2.3 U	ND	< 2.3 U
Butane	ug/m3			< 25 U	< 4.8 U	ND	< 4.8 U	< 27 U	**110 E**	**105**	< 26 U	**120 E**	**115**	< 4.8 U
Carbon Disulfide	ug/m3	320	11000	< 32 U	< 6.2 U	ND	< 6.2 U	< 35 U	< 6.2 U	ND	< 34 U	< 6.2 U	ND	< 6.2 U
Carbon Tetrachloride	ug/m3	0.42	14	< 1.6 U	**0.45**	**-0.01**	**0.46**	< 1.8 U	**0.46**	**0.02**	< 1.7 U	**0.46**	**0.02**	**0.44**
Chlorobenzene	ug/m3	23	760	< 2.4 U	< 0.46 U	ND	< 0.46 U	< 2.6 U	< 0.46 U	ND	< 2.5 U	< 0.46 U	ND	< 0.46 U
Chloroethane	ug/m3	4600	150000	< 14 U	< 2.6 U	ND	< 2.6 U	< 15 U	< 2.6 U	ND	< 15 U	< 2.6 U	ND	< 2.6 U
Chloroform	ug/m3	0.11	3.6	**0.3**	**0.078**	**0**	**0.078**	**46**	**0.14**	**0.052**	**2.6**	**0.14**	**0.052**	**0.088**

Table 3. Vapor Analytical Results

Project No. 210222, McCollum Park Site, Everett, Washington

				BMX Building				Pool Building						
			Location	BMX-1-SG	BMX-1-IA	BMX-1-IA (corrected)	BMX-AA	POOL-1-SG	POOL-1-IA	POOL-1-IA (corrected)	POOL-2-SG	POOL-2-IA	POOL-2-IA (corrected)	POOL-AA
			Date	04/27/2021	04/26/2021		04/26/2021	04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/26/2021
Analyte	**Unit**	**Indoor Air Cleanup Level - MTCA Method B**	**Sub-Slab Soil Gas Screening Level - MTCA Method B**											
Chloromethane	ug/m3	41	1400	< 19 U	< 3.7 U	ND	< 3.7 U	< 21 U	< 3.7 U	ND	< 20 U	< 3.7 U	ND	< 3.7 U
cis-1,2-Dichloroethene (cDCE)	ug/m3			< 2.1 U	< 0.4 U	ND	< 0.4 U	< 2.2 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 0.4 U
cis-1,3-Dichloropropene	ug/m3			< 2.4 U	< 0.45 U	ND	< 0.45 U	< 2.5 U	< 0.45 U	ND	< 2.5 U	< 0.45 U	ND	< 0.45 U
Cyclohexane	ug/m3	2700	91000	< 36 U	< 6.9 U	ND	< 6.9 U	< 39 U	< 6.9 U	ND	< 38 U	< 6.9 U	ND	< 6.9 U
Dibromochloromethane	ug/m3			< 0.44 U	< 0.085 U	ND	< 0.085 U	< 0.48 U	< 0.085 U	ND	< 0.47 U	< 0.085 U	ND	< 0.085 U
Dichlorodifluoromethane	ug/m3	46	1500	**3.2**	**16**	**13.3**	**2.7**	< 2.8 U	**2.8**	**0.2**	**3**	**2.6**	**0**	**2.6**
Ethanol	ug/m3			< 39 U	< 7.5 U	ND	< 7.5 U	**520 E**	**50 E**	**42.5**	**49**	**64 E**	**56.5**	< 7.5 U
Ethyl acetate	ug/m3	32	1100	< 37 U	< 7.2 U	ND	< 7.2 U	< 40 U	< 7.2 U	ND	< 40 U	< 7.2 U	ND	< 7.2 U
Isopropyl Alcohol	ug/m3	91		< 45 U	< 8.6 U	ND	< 8.6 U	**130**	< 8.6 U	ND	< 47 U	< 8.6 U	ND	< 8.6 U
Isopropylbenzene	ug/m3	180	6100	< 13 U	< 2.5 U	ND	< 2.5 U	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
m,p-Xylenes	ug/m3	46	1500	< 4.5 U	< 0.87 U	ND	< 0.87 U	**8.1**	**8.8**	**7.93**	**8**	**9.2**	**8.33**	< 0.87 U
Methyl Methacrylate	ug/m3	320	11000	< 21 U	< 4.1 U	ND	< 4.1 U	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
Methyl tert-butyl ether (MTBE)	ug/m3	9.6	320	< 9.4 U	< 1.8 U	ND	< 1.8 U	< 10 U	< 1.8 U	ND	< 9.9 U	< 1.8 U	ND	< 1.8 U
Methylene Chloride	ug/m3	66	2200	**190 C**	**61 E**	**-3**	**64 E**	**670 CE**	**50 C**	**0**	< 190 U	**61 CE**	**0**	**74 CE**
n-Hexane	ug/m3	320	11000	< 18 U	< 3.5 U	ND	< 3.5 U	< 20 U	**7.5**	**4**	< 19 U	**7.6**	**4.1**	< 3.5 U
Nonane	ug/m3			< 27 U	< 5.2 U	ND	< 5.2 U	< 29 U	< 5.2 U	ND	< 29 U	< 5.2 U	ND	< 5.2 U
n-Propylbenzene	ug/m3	460	15000	< 13 U	< 2.5 U	ND	< 2.5 U	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
o-Xylene	ug/m3	46	1500	< 2.3 U	< 0.43 U	ND	< 0.43 U	**3.5**	**2.8**	**2.37**	**4.2**	**3**	**2.57**	< 0.43 U
Pentane	ug/m3	460		< 15 U	< 3 U	ND	< 3 U	< 17 U	**28**	**25**	< 16 U	**28**	**25**	< 3 U
Styrene	ug/m3	460	15000	< 4.4 U	< 0.85 U	ND	< 0.85 U	< 4.8 U	< 0.85 U	ND	< 4.7 U	< 0.85 U	ND	< 0.85 U
t-Butyl alcohol (TBA)	ug/m3			< 63 U	< 12 U	ND	< 12 U	< 68 U	< 12 U	ND	< 67 U	< 12 U	ND	< 12 U
Tetrachloroethene (PCE)	ug/m3	9.6	320	< 35 U	< 6.8 U	ND	< 6.8 U	< 38 U	< 6.8 U	ND	< 37 U	< 6.8 U	ND	< 6.8 U
Tetrahydrofuran	ug/m3	910	30000	**12**	< 0.3 U	ND	< 0.3 U	**17**	< 0.3 U	ND	**15**	< 0.3 U	ND	< 0.3 U
trans-1,2-Dichloroethene	ug/m3	18	610	< 2.1 U	< 0.4 U	ND	< 0.4 U	< 2.2 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 0.4 U
trans-1,3-Dichloropropene	ug/m3			< 2.4 U	< 0.45 U	ND	< 0.45 U	< 2.5 U	< 0.45 U	ND	< 2.5 U	< 0.45 U	ND	< 0.45 U
Trichloroethene (TCE)	ug/m3	0.33	11	< 0.56 U	< 0.11 U	ND	< 0.11 U	< 0.6 U	< 0.11 U	ND	< 0.59 U	< 0.11 U	ND	< 0.11 U
Trichlorofluoromethane	ug/m3	320	11000	< 12 U	**6.5**	**4.3**	< 2.2 U	< 13 U	< 2.2 U	ND	< 12 U	< 2.2 U	ND	< 2.2 U
Vinyl Acetate	ug/m3	91	3000	< 37 U	< 7 U	ND	< 7 U	< 39 U	< 7 U	ND	< 39 U	< 7 U	ND	< 7 U
Vinyl Bromide	ug/m3	0.17	5.6	< 2.3 U	< 0.44 U	ND	< 0.44 U	< 2.4 U	< 0.44 U	ND	< 2.4 U	< 0.44 U	ND	< 0.44 U
Vinyl Chloride	ug/m3	0.28	9.5	< 1.3 U	< 0.26 U	ND	< 0.26 U	< 1.4 U	< 0.26 U	ND	< 1.4 U	< 0.26 U	ND	< 0.26 U
1,3-Butadiene	ug/m3	0.083	2.8	< 0.23 U	< 0.044 U	ND	< 0.044 U	< 0.25 U	< 0.044 U	ND	< 0.24 U	< 0.044 U	ND	< 0.044 U
2,2,4-Trimethylpentane	ug/m3			< 24 U	< 4.7 U	ND	< 4.7 U	< 26 U	< 4.7 U	ND	< 26 U	< 4.7 U	ND	< 4.7 U
4-Ethyltoluene	ug/m3			< 13 U	< 2.5 U	ND	< 2.5 U	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
alpha-Chlorotoluene	ug/m3	0.051	1.7	< 0.27 U	< 0.052 U	ND	< 0.052 U	< 0.29 U	< 0.052 U	ND	< 0.28 U	< 0.052 U	ND	< 0.052 U
Freon 114	ug/m3			< 3.6 U	< 0.7 U	ND	< 0.7 U	< 3.9 U	< 0.7 U	ND	< 3.8 U	< 0.7 U	ND	< 0.7 U
Heptane	ug/m3	180	6100	< 21 U	< 4.1 U	ND	< 4.1 U	< 23 U	**4.4**	**0.3**	< 23 U	**4.8**	**0.7**	< 4.1 U
Other														
Helium	%			< 0.6 U	--	--	--	< 0.6 U	--	--	< 0.6 U	--	--	--

Bold - detected
Blue Shaded - Detected result or non-detected RL exceeded Indoor Air screening level
Orange Shaded - Detected result or non-detected RL exceeded Sub-Slab Soil Gas screening level
U - Analyte not detected at or above Reporting Limit (RL) shown
J - Result value estimated
UJ - Analyte not detected and the Reporting Limit (RL) is an estimate
E - Result exceeded calibration range. Result usable for qualitative analysis of analyte presence, but numeric value should not be included in quantitative analysis.
C - Result may be influenced by unconfirmed contamination as part of the analytical process.

Table 3. Vapor Analytical Results

Project No. 210222, McCollum Park Site, Everett, Washington

DRAFT

				WSU Extension Building						WSU Education Building						
			Location	WSU-EX1-SG	WSU-EX1-IA	WSU-EX1-IA (corrected)	WSU-EX2-SG	WSU-EX2-IA	WSU-EX2-IA (corrected)	WSU-ED1-SG	WSU-ED1-IA	WSU-ED1-IA (corrected)	WSU-ED2-SG	WSU-ED2-IA	WSU-ED2-IA (corrected)	WSU-AA
			Date	04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/26/2021
Analyte	Unit	Indoor Air Cleanup Level - MTCA Method B	Sub-Slab Soil Gas Screening Level - MTCA Method B													
APH																
C5 - C8 Aliphatic Hydrocarbons	ug/m3			**530**	**120**	**35**	**730**	**130**	**45**	**520**	**170**	**85**	**510**	**150**	**65**	**85**
C9 - C12 Aliphatic Hydrocarbons	ug/m3			< 150 U	< 25 U	ND	< 210 U	< 25 U	ND	**150**	< 25 U	ND	< 140 U	**150**	**125**	< 25 U
C9 - C10 Aromatic Hydrocarbons	ug/m3			< 150 U	< 25 U	ND	< 210 U	< 25 U	ND	< 140 U	< 25 U	ND	< 140 U	< 25 U	ND	< 25 U
Total Petroleum Hydrocarbons (ND = 1/2 RL	ug/m3	140	4700	**742**	**156**	**35**	**1030**	**166**	**45**	**796**	**212**	**91**	**712**	**333**	**212**	**121**
BTEX																
Benzene	ug/m3	0.32	11	< 1.9 U	< 0.32 U	ND	< 2.7 U	< 0.32 U	ND	< 1.8 U	**1**	**0.68**	< 1.8 U	**1.4**	**1.08**	< 0.32 U
Toluene	ug/m3	2300	76000	< 110 U	< 19 U	ND	< 160 U	< 19 U	ND	< 100 U	< 19 U	ND	< 110 U	< 19 U	ND	< 19 U
Ethylbenzene	ug/m3	460	15000	< 2.6 U	< 0.43 U	ND	< 3.7 U	< 0.43 U	ND	< 2.4 U	**1.1**	**0.67**	< 2.5 U	**1.5**	**1.07**	< 0.43 U
Total Xylenes	ug/m3	46	1500	< 5.1 U	< 0.87 U	ND	< 7.4 U	< 0.87 U	ND	< 4.8 U	**5.3**	**4.43**	< 5 U	**7.7**	**6.83**	< 0.87 U
Other SVOCs																
1,4-Dioxane	ug/m3	0.5	17	< 2.1 U	< 0.36 U	ND	< 3.1 U	< 0.36 U	ND	< 2 U	< 0.36 U	ND	< 2.1 U	< 0.36 U	ND	< 0.36 U
Hexachlorobutadiene	ug/m3	0.11	3.8	< 3.1 U	< 0.53 U	ND	< 4.5 U	< 0.53 U	ND	< 3 U	< 0.53 U	ND	< 3 U	< 0.53 U	ND	< 0.53 U
PAHs																
Naphthalene	ug/m3	0.073	2.5	< 1.5 U	**0.24**	**0.18**	< 2.2 U	**0.34**	**0.28**	< 1.4 U	**0.14**	**0.083**	< 1.5 U	**0.33**	**0.273**	< 0.057 UJ
VOCs																
1,1,1-Trichloroethane	ug/m3	2300	76000	< 3.2 U	< 0.55 U	ND	< 4.6 U	< 0.55 U	ND	< 3 U	< 0.55 U	ND	< 3.1 U	< 0.55 U	ND	< 0.55 U
1,1,2,2-Tetrachloroethane	ug/m3	0.043	1.4	< 0.81 U	< 0.14 U	ND	< 1.2 U	< 0.14 U	ND	< 0.76 U	< 0.14 U	ND	< 0.78 U	< 0.14 U	ND	< 0.14 U
1,1,2-Trichloroethane	ug/m3	0.091	3	< 0.32 U	< 0.055 U	ND	< 0.46 U	< 0.055 U	ND	< 0.3 U	< 0.055 U	ND	< 0.31 U	< 0.055 U	ND	< 0.055 U
1,1,2-Trichlorotrifluoroethane	ug/m3	2300	76000	< 4.5 U	< 0.77 U	ND	< 6.5 U	< 0.77 U	ND	< 4.2 U	< 0.77 U	ND	< 4.4 U	< 0.77 U	ND	< 0.77 U
1,1-Dichloroethane	ug/m3	1.6	52	< 2.4 U	< 0.4 U	ND	< 3.4 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 2.3 U	< 0.4 U	ND	< 0.4 U
1,1-Dichloroethene	ug/m3	91	3000	< 2.3 U	< 0.4 U	ND	< 3.4 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 2.3 U	< 0.4 U	ND	< 0.4 U
1,2,4-Trichlorobenzene	ug/m3	0.91	30	< 4.4 U	< 0.74 U	ND	< 6.3 U	< 0.74 U	ND	< 4.1 U	< 0.74 U	ND	< 4.2 U	< 0.74 U	ND	< 0.74 U
1,2,4-Trimethylbenzene	ug/m3	27	910	< 15 U	< 2.5 U	ND	< 21 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
1,2-Dibromoethane (EDB)	ug/m3	0.0042	0.14	< 0.45 U	< 0.077 U	ND	< 0.65 U	< 0.077 U	ND	< 0.42 U	< 0.077 U	ND	< 0.44 U	< 0.077 U	ND	< 0.077 U
1,2-Dichlorobenzene	ug/m3	91	3000	< 3.5 U	< 0.6 U	ND	< 5.1 U	< 0.6 U	ND	< 3.3 U	< 0.6 U	ND	< 3.4 U	< 0.6 U	ND	< 0.6 U
1,2-Dichloroethane (EDC)	ug/m3	0.096	3.2	< 0.24 U	**0.22**	**0.139**	< 0.34 U	**0.15**	**0.069**	< 0.22 U	**0.089**	**0.008**	< 0.23 U	**0.077**	**-0.004**	**0.081**
1,2-Dichloropropane	ug/m3	0.68	23	< 1.4 U	< 0.23 U	ND	< 2 U	< 0.23 U	ND	< 1.3 U	< 0.23 U	ND	< 1.3 U	< 0.23 U	ND	< 0.23 U
1,3,5-Trimethylbenzene	ug/m3	27	910	< 15 U	< 2.5 U	ND	< 21 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
1,3-Dichlorobenzene	ug/m3			< 3.5 U	< 0.6 U	ND	< 5.1 U	< 0.6 U	ND	< 3.3 U	< 0.6 U	ND	< 3.4 U	< 0.6 U	ND	< 0.6 U
1,4-Dichlorobenzene	ug/m3	0.23	7.6	< 1.4 U	< 0.23 U	ND	< 2 U	**0.23**	ND	< 1.3 U	< 0.23 U	ND	< 1.4 U	< 0.23 U	ND	< 0.23 U
1-Propene	ug/m3			< 7.1 U	< 1.2 U	ND	< 10 U	< 1.2 U	ND	< 6.6 U	< 1.2 U	ND	< 6.9 U	< 1.2 U	ND	< 1.2 U
2-Butanone	ug/m3	2300	76000	< 17 U	< 2.9 U	ND	< 25 U	< 2.9 U	ND	< 16 U	< 2.9 U	ND	< 17 U	< 2.9 U	ND	< 2.9 U
2-Chlorotoluene	ug/m3			< 31 U	< 5.2 U	ND	< 44 U	< 5.2 U	ND	< 28 U	< 5.2 U	ND	< 30 U	< 5.2 U	ND	< 5.2 U
2-Hexanone	ug/m3	14	460	< 24 U	< 4.1 U	ND	< 35 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
4-Methyl-2-pentanone	ug/m3	1400	46000	< 24 U	< 4.1 U	ND	< 35 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
Acetone	ug/m3	14000	470000	**75**	**6.6**	**1**	< 40 U	**9.4**	**3.8**	**45**	**7**	**1.4**	**140**	**6**	**0.4**	**5.6**
Acrolein	ug/m3	0.0091	0.3	< 0.68 U	**0.37**	**0.25**	< 0.97 U	**0.45**	**0.33**	**0.78**	**0.41**	**0.29**	< 0.65 U	**0.5**	**0.38**	**0.12**
Allyl Chloride	ug/m3	0.42	14	< 9.2 U	< 1.6 U	ND	< 13 U	< 1.6 U	ND	< 8.6 U	< 1.6 U	ND	< 8.9 U	< 1.6 U	ND	< 1.6 U
Bromodichloromethane	ug/m3	0.068	2.3	< 0.4 U	< 0.067 U	ND	< 0.57 U	< 0.067 U	ND	< 0.37 U	< 0.067 U	ND	< 0.38 U	< 0.067 U	ND	< 0.067 U
Bromoform	ug/m3	2.3	76	< 12 U	< 2.1 U	ND	< 18 U	< 2.1 U	ND	< 11 U	< 2.1 U	ND	< 12 U	< 2.1 U	ND	< 2.1 U
Bromomethane	ug/m3	2.3	76	< 14 U	< 2.3 U	ND	< 20 U	< 2.3 U	ND	< 13 U	< 2.3 U	ND	< 13 U	< 2.3 U	ND	< 2.3 U
Butane	ug/m3			< 28 U	< 4.8 U	ND	< 40 U	< 4.8 U	ND	< 26 U	< 4.8 U	ND	< 27 U	< 4.8 U	ND	< 4.8 U
Carbon Disulfide	ug/m3	320	11000	< 37 U	< 6.2 U	ND	< 53 U	< 6.2 U	ND	< 34 U	< 6.2 U	ND	< 36 U	< 6.2 U	ND	< 6.2 U
Carbon Tetrachloride	ug/m3	0.42	14	< 1.9 U	**0.45**	**0**	< 2.7 U	**0.45**	**0**	< 1.7 U	**0.45**	**0**	< 1.8 U	**0.46**	**0.01**	**0.45**
Chlorobenzene	ug/m3	23	760	< 2.7 U	< 0.46 U	ND	< 3.9 U	< 0.46 U	ND	< 2.5 U	< 0.46 U	ND	< 2.6 U	< 0.46 U	ND	< 0.46 U
Chloroethane	ug/m3	4600	150000	< 16 U	< 2.6 U	ND	< 22 U	< 2.6 U	ND	< 15 U	< 2.6 U	ND	< 15 U	< 2.6 U	ND	< 2.6 U
Chloroform	ug/m3	0.11	3.6	**0.52**	**0.13**	**0.047**	**1**	**0.2**	**0.117**	< 0.27 U	**0.098**	**0.015**	< 0.28 U	**0.11**	**0.027**	**0.083**

Table 3. Vapor Analytical Results

Project No. 210222, McCollum Park Site, Everett, Washington

				WSU Extension Building						WSU Education Building						
			Location	WSU-EX1-SG	WSU-EX1-IA	WSU-EX1-IA (corrected)	WSU-EX2-SG	WSU-EX2-IA	WSU-EX2-IA (corrected)	WSU-ED1-SG	WSU-ED1-IA	WSU-ED1-IA (corrected)	WSU-ED2-SG	WSU-ED2-IA	WSU-ED2-IA (corrected)	WSU-AA
			Date	04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/27/2021	04/26/2021		04/26/2021
Analyte	Unit	Indoor Air Cleanup Level - MTCA Method B	Sub-Slab Soil Gas Screening Level - MTCA Method B													
Chloromethane	ug/m3	41	1400	< 22 U	< 3.7 U	ND	< 32 U	< 3.7 U	ND	< 20 U	< 3.7 U	ND	< 21 U	< 3.7 U	ND	< 3.7 U
cis-1,2-Dichloroethene (cDCE)	ug/m3			< 2.3 U	< 0.4 U	ND	< 3.4 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 2.3 U	< 0.4 U	ND	< 0.4 U
cis-1,3-Dichloropropene	ug/m3			< 2.7 U	< 0.45 U	ND	< 3.9 U	< 0.45 U	ND	< 2.5 U	< 0.45 U	ND	< 2.6 U	< 0.45 U	ND	< 0.45 U
Cyclohexane	ug/m3	2700	91000	< 41 U	< 6.9 U	ND	< 59 U	< 6.9 U	ND	< 38 U	< 6.9 U	ND	< 39 U	< 6.9 U	ND	< 6.9 U
Dibromochloromethane	ug/m3			< 0.5 U	< 0.085 U	ND	< 0.72 U	< 0.085 U	ND	< 0.47 U	< 0.085 U	ND	< 0.49 U	< 0.085 U	ND	< 0.085 U
Dichlorodifluoromethane	ug/m3	46	1500	< 2.9 U	**2.7**	**-0.1**	< 4.2 U	**2.4**	**-0.4**	< 2.7 U	**2.5**	**-0.3**	< 2.8 U	**2.9**	**0.1**	**2.8**
Ethanol	ug/m3			< 44 U	**30 E**	**22.5**	< 64 U	**42 E**	**34.5**	**74**	**14 J**	**6.5**	**99**	**21 J**	**13.5**	< 7.5 U
Ethyl acetate	ug/m3	32	1100	< 43 U	< 7.2 U	ND	< 61 U	< 7.2 U	ND	< 40 U	< 7.2 U	ND	< 41 U	< 7.2 U	ND	< 7.2 U
Isopropyl Alcohol	ug/m3	91		**66**	< 8.6 U	ND	< 73 U	< 8.6 U	ND	**81**	< 8.6 U	ND	**80**	< 8.6 U	ND	< 8.6 U
Isopropylbenzene	ug/m3	180	6100	< 15 U	< 2.5 U	ND	< 21 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
m,p-Xylenes	ug/m3	46	1500	< 5.1 U	< 0.87 U	ND	< 7.4 U	< 0.87 U	ND	< 4.8 U	**4**	**3.13**	< 5 U	**5.9**	**5.03**	< 0.87 U
Methyl Methacrylate	ug/m3	320	11000	< 24 U	< 4.1 U	ND	< 35 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
Methyl tert-butyl ether (MTBE)	ug/m3	9.6	320	< 11 U	< 1.8 U	ND	< 15 U	< 1.8 U	ND	< 9.9 U	< 1.8 U	ND	< 10 U	< 1.8 U	ND	< 1.8 U
Methylene Chloride	ug/m3	66	2200	< 200 U	< 35 U	ND	< 300 U	**73 CE**	ND	**210 C**	**130 CE**	**57 CE**	< 200 U	**47 C**	0	**73 CE**
n-Hexane	ug/m3	320	11000	< 21 U	< 3.5 U	ND	< 30 U	< 3.5 U	ND	< 19 U	< 3.5 U	ND	< 20 U	< 3.5 U	ND	< 3.5 U
Nonane	ug/m3			< 31 U	< 5.2 U	ND	< 45 U	< 5.2 U	ND	< 29 U	< 5.2 U	ND	< 30 U	< 5.2 U	ND	< 5.2 U
n-Propylbenzene	ug/m3	460	15000	< 15 U	< 2.5 U	ND	< 21 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
o-Xylene	ug/m3	46	1500	< 2.6 U	< 0.43 U	ND	< 3.7 U	< 0.43 U	ND	< 2.4 U	**1.3**	**0.87**	< 2.5 U	**1.8**	**1.37**	< 0.43 U
Pentane	ug/m3	460		< 17 U	< 3 U	ND	< 25 U	< 3 U	ND	< 16 U	**4.7**	**1.7**	< 17 U	**6.2**	**3.2**	< 3 U
Styrene	ug/m3	460	15000	< 5 U	< 0.85 U	ND	< 7.2 U	< 0.85 U	ND	< 4.7 U	< 0.85 U	ND	< 4.9 U	< 0.85 U	ND	< 0.85 U
t-Butyl alcohol (TBA)	ug/m3			< 72 U	< 12 U	ND	< 100 U	< 12 U	ND	< 67 U	< 12 U	ND	< 69 U	< 12 U	ND	< 12 U
Tetrachloroethene (PCE)	ug/m3	9.6	320	< 40 U	< 6.8 U	ND	< 58 U	< 6.8 U	ND	< 37 U	< 6.8 U	ND	< 39 U	< 6.8 U	ND	< 6.8 U
Tetrahydrofuran	ug/m3	910	30000	**12**	< 0.3 U	ND	**12**	< 0.3 U	ND	**6.7**	**0.89**	**0.59**	**6.3**	**0.95**	**0.65**	< 0.3 U
trans-1,2-Dichloroethene	ug/m3	18	610	< 2.3 U	< 0.4 U	ND	< 3.4 U	< 0.4 U	ND	< 2.2 U	< 0.4 U	ND	< 2.3 U	< 0.4 U	ND	< 0.4 U
trans-1,3-Dichloropropene	ug/m3			< 2.7 U	< 0.45 U	ND	< 3.9 U	< 0.45 U	ND	< 2.5 U	< 0.45 U	ND	< 2.6 U	< 0.45 U	ND	< 0.45 U
Trichloroethene (TCE)	ug/m3	0.33	11	< 0.63 U	< 0.11 U	ND	< 0.91 U	< 0.11 U	ND	< 0.59 U	< 0.11 U	ND	< 0.61 U	< 0.11 U	ND	< 0.11 U
Trichlorofluoromethane	ug/m3	320	11000	< 13 U	< 2.2 U	ND	< 19 U	< 2.2 U	ND	< 12 U	< 2.2 U	ND	< 13 U	< 2.2 U	ND	< 2.2 U
Vinyl Acetate	ug/m3	91	3000	< 42 U	< 7 U	ND	< 60 U	< 7 U	ND	< 39 U	< 7 U	ND	< 40 U	< 7 U	ND	< 7 U
Vinyl Bromide	ug/m3	0.17	5.6	< 2.6 U	< 0.44 U	ND	< 3.7 U	< 0.44 U	ND	< 2.4 U	< 0.44 U	ND	< 2.5 U	< 0.44 U	ND	< 0.44 U
Vinyl Chloride	ug/m3	0.28	9.5	< 1.5 U	< 0.26 U	ND	< 2.2 U	< 0.26 U	ND	< 1.4 U	< 0.26 U	ND	< 1.5 U	< 0.26 U	ND	< 0.26 U
1,3-Butadiene	ug/m3	0.083	2.8	< 0.26 U	**0.069**	**0.025**	< 0.38 U	< 0.044 U	ND	< 0.24 U	< 0.044 U	ND	< 0.25 U	< 0.044 U	ND	< 0.044 U
2,2,4-Trimethylpentane	ug/m3			< 28 U	< 4.7 U	ND	< 40 U	< 4.7 U	ND	< 26 U	< 4.7 U	ND	< 27 U	< 4.7 U	ND	< 4.7 U
4-Ethyltoluene	ug/m3			< 15 U	< 2.5 U	ND	< 21 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 14 U	< 2.5 U	ND	< 2.5 U
alpha-Chlorotoluene	ug/m3	0.051	1.7	< 0.31 U	< 0.052 U	ND	< 0.44 U	< 0.052 U	ND	< 0.28 U	< 0.052 U	ND	< 0.3 U	< 0.052 U	ND	< 0.052 U
Freon 114	ug/m3			< 4.1 U	< 0.7 U	ND	< 5.9 U	< 0.7 U	ND	< 3.8 U	< 0.7 U	ND	< 4 U	< 0.7 U	ND	< 0.7 U
Heptane	ug/m3	180	6100	< 24 U	< 4.1 U	ND	< 35 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 23 U	< 4.1 U	ND	< 4.1 U
Other																
Helium	%			< 0.6 U	--	--	< 0.6 U	--	--	< 0.6 U	--	--	< 0.6 U	--	--	--

Bold - detected
Blue Shaded - Detected result or non-detected RL exceeded Indoor Air screening level
Orange Shaded - Detected result or non-detected RL exceeded Sub-Slab Soil Gas screening level
U - Analyte not detected at or above Reporting Limit (RL) shown
J - Result value estimated
UJ - Analyte not detected and the Reporting Limit (RL) is an estimate
E - Result exceeded calibration range. Result usable for qualitative analysis of analyte presence, but numeric valu
C - Result may be influenced by unconfirmed contamination as part of the analytical process.

Table 3. Vapor Analytical Results

Project No. 210222, McCollum Park Site, Everett, Washington

				Adopt-a-Stream Building						
			Location	STREAM-1-IA	STREAM-1-IA (corrected)	STREAM-2-IA	STREAM-2-IA (corrected)	STREAM-3-IA	STREAM-3-IA (corrected)	STREAM-AA
			Date	04/26/2021		04/26/2021		04/26/2021		04/26/2021
Analyte	Unit	Indoor Air Cleanup Level - MTCA Method B	Sub-Slab Soil Gas Screening Level - MTCA Method B							
APH										
C5 - C8 Aliphatic Hydrocarbons	ug/m3			**130**	**30**	**100**	**0**	**120**	**20**	**100**
C9 - C12 Aliphatic Hydrocarbons	ug/m3			**67**	**42**	< 25 U	ND	**36**	**11**	< 25 U
C9 - C10 Aromatic Hydrocarbons	ug/m3			< 25 U	ND	< 25 U	ND	< 25 U	ND	< 25 U
Total Petroleum Hydrocarbons (ND = 1/2 RL	ug/m3	140	4700	**226**	**90**	**136**	**0**	**179**	**43**	**136**
BTEX										
Benzene	ug/m3	0.32	11	< 0.32 U	ND	< 0.32 U	ND	< 0.32 U	ND	< 0.32 U
Toluene	ug/m3	2300	76000	< 28 U	ND	< 19 U	ND	< 19 U	ND	< 19 U
Ethylbenzene	ug/m3	460	15000	< 0.43 U	ND	< 0.43 U	ND	< 0.43 U	ND	< 0.43 U
Total Xylenes	ug/m3	46	1500	**1.7**	**0.83**	< 0.87 U	ND	< 0.87 U	ND	< 0.87 U
Other SVOCs										
1,4-Dioxane	ug/m3	0.5	17	< 0.54 U	ND	< 0.36 U	ND	< 0.36 U	ND	< 0.36 U
Hexachlorobutadiene	ug/m3	0.11	3.8	< 0.53 U	ND	< 0.53 U	ND	< 0.53 U	ND	< 0.53 U
PAHs										
Naphthalene	ug/m3	0.073	2.5	**0.26**	**0.203**	**0.21**	**0.153**	**0.13**	**0.073**	< 0.057 UJ
VOCs										
1,1,1-Trichloroethane	ug/m3	2300	76000	< 0.55 U	ND	< 0.55 U	ND	< 0.55 U	ND	< 0.55 U
1,1,2,2-Tetrachloroethane	ug/m3	0.043	1.4	< 0.14 U	ND	< 0.14 U	ND	< 0.14 U	ND	< 0.14 U
1,1,2-Trichloroethane	ug/m3	0.091	3	< 0.082 U	ND	< 0.055 U	ND	< 0.055 U	ND	< 0.055 U
1,1,2-Trichlorotrifluoroethane	ug/m3	2300	76000	< 0.77 U	ND	< 0.77 U	ND	< 0.77 U	ND	< 0.77 U
1,1-Dichloroethane	ug/m3	1.6	52	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U
1,1-Dichloroethene	ug/m3	91	3000	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U
1,2,4-Trichlorobenzene	ug/m3	0.91	30	< 0.74 U	ND	< 0.74 U	ND	< 0.74 U	ND	< 0.74 U
1,2,4-Trimethylbenzene	ug/m3	27	910	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U
1,2-Dibromoethane (EDB)	ug/m3	0.0042	0.14	< 0.12 U	ND	< 0.077 U	ND	< 0.077 U	ND	< 0.077 U
1,2-Dichlorobenzene	ug/m3	91	3000	< 0.6 U	ND	< 0.6 U	ND	< 0.6 U	ND	< 0.6 U
1,2-Dichloroethane (EDC)	ug/m3	0.096	3.2	**0.1**	**0.023**	**0.077**	**0**	**0.085**	**0.008**	**0.077**
1,2-Dichloropropane	ug/m3	0.68	23	< 0.35 U	ND	< 0.23 U	ND	< 0.23 U	ND	< 0.23 U
1,3,5-Trimethylbenzene	ug/m3	27	910	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U
1,3-Dichlorobenzene	ug/m3			< 0.6 U	ND	< 0.6 U	ND	< 0.6 U	ND	< 0.6 U
1,4-Dichlorobenzene	ug/m3	0.23	7.6	< 0.23 U	ND	< 0.23 U	ND	< 0.23 U	ND	< 0.23 U
1-Propene	ug/m3			< 1.2 U	ND	< 1.2 U	ND	< 1.2 U	ND	< 1.2 U
2-Butanone	ug/m3	2300	76000	< 2.9 U	ND	< 2.9 U	ND	< 2.9 U	ND	< 2.9 U
2-Chlorotoluene	ug/m3			< 5.2 U	ND	< 5.2 U	ND	< 5.2 U	ND	< 5.2 U
2-Hexanone	ug/m3	14	460	< 6.1 U	ND	< 4.1 U	ND	< 4.1 U	ND	< 4.1 U
4-Methyl-2-pentanone	ug/m3	1400	46000	< 6.1 U	ND	< 4.1 U	ND	< 4.1 U	ND	< 4.1 U
Acetone	ug/m3	14000	470000	**20**	**15**	**7.2**	**2.2**	**13**	**8**	**5**
Acrolein	ug/m3	0.0091	0.3	**1.1**	**0.96**	**0.61**	**0.47**	**0.82**	**0.68**	**0.14**
Allyl Chloride	ug/m3	0.42	14	< 1.6 U	ND	< 1.6 U	ND	< 1.6 U	ND	< 1.6 U
Bromodichloromethane	ug/m3	0.068	2.3	< 0.1 U	ND	< 0.067 U	ND	< 0.067 U	ND	< 0.067 U
Bromoform	ug/m3	2.3	76	< 2.1 U	ND	< 2.1 U	ND	< 2.1 U	ND	< 2.1 U
Bromomethane	ug/m3	2.3	76	< 2.3 U	ND	< 2.3 U	ND	< 2.3 U	ND	< 2.3 U
Butane	ug/m3			< 4.8 U	ND	< 4.8 U	ND	< 4.8 U	ND	< 4.8 U
Carbon Disulfide	ug/m3	320	11000	< 6.2 U	ND	< 6.2 U	ND	< 6.2 U	ND	< 6.2 U
Carbon Tetrachloride	ug/m3	0.42	14	**0.52**	**0.06**	**0.45**	**-0.01**	**0.47**	**0.01**	**0.46**
Chlorobenzene	ug/m3	23	760	< 0.46 U	ND	< 0.46 U	ND	< 0.46 U	ND	< 0.46 U
Chloroethane	ug/m3	4600	150000	< 2.6 U	ND	< 2.6 U	ND	< 2.6 U	ND	< 2.6 U
Chloroform	ug/m3	0.11	3.6	**0.27**	**0.192**	**0.12**	**0.042**	**0.093**	**0.015**	**0.078**

Table 3. Vapor Analytical Results

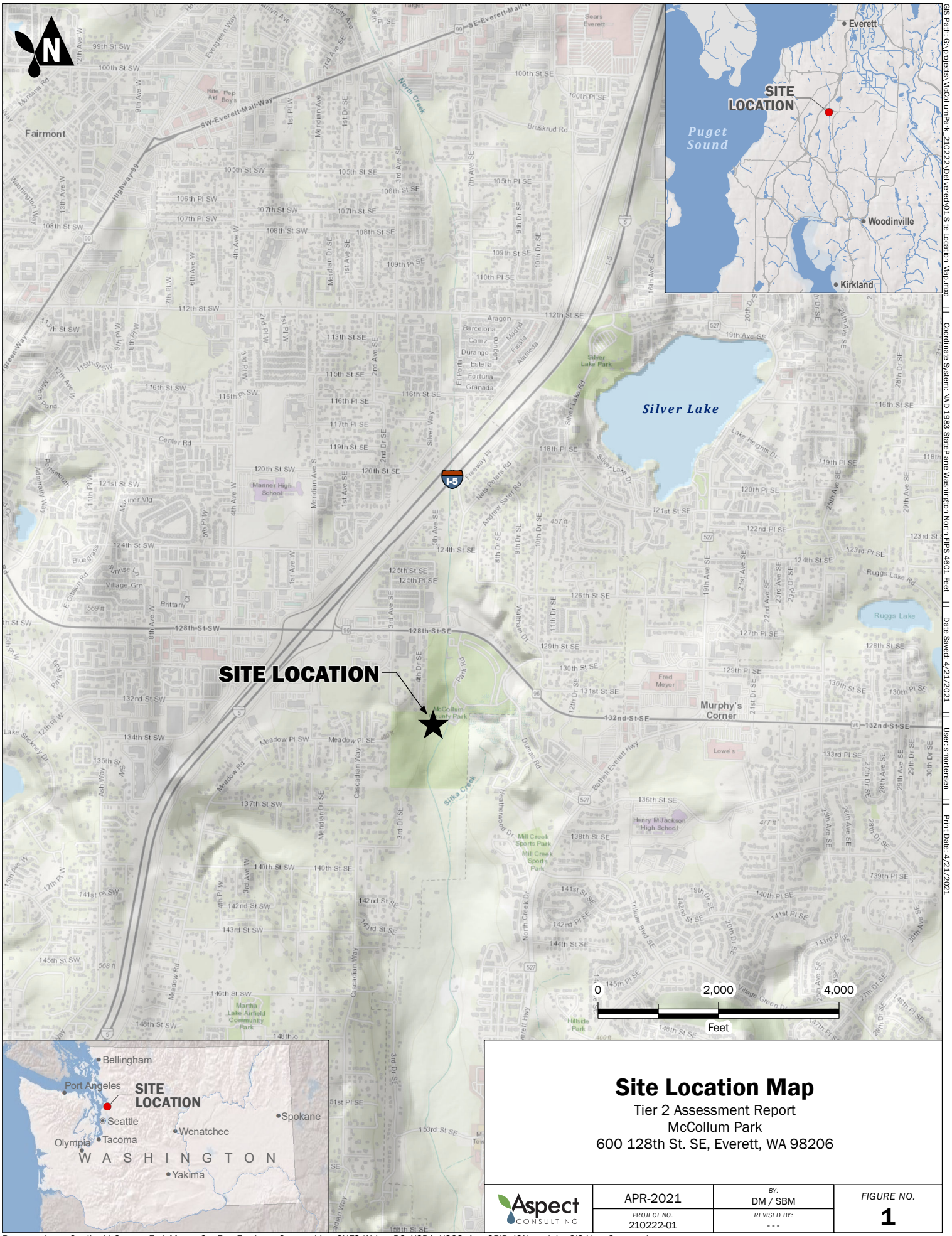
Project No. 210222, McCollum Park Site, Everett, Washington

				Adopt-a-Stream Building						
			Location	STREAM-1-IA	STREAM-1-IA (corrected)	STREAM-2-IA	STREAM-2-IA (corrected)	STREAM-3-IA	STREAM-3-IA (corrected)	STREAM-AA
			Date	04/26/2021		04/26/2021		04/26/2021		04/26/2021
Analyte	Unit	Indoor Air Cleanup Level - MTCA Method B	Sub-Slab Soil Gas Screening Level - MTCA Method B							
Chloromethane	ug/m3	41	1400	< 3.7 U	ND	< 3.7 U	ND	< 3.7 U	ND	< 3.7 U
cis-1,2-Dichloroethene (cDCE)	ug/m3			< 0.4 U	ND	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U
cis-1,3-Dichloropropene	ug/m3			< 0.68 U	ND	< 0.45 U	ND	< 0.45 U	ND	< 0.45 U
Cyclohexane	ug/m3	2700	91000	< 6.9 U	ND	< 6.9 U	ND	< 6.9 U	ND	< 6.9 U
Dibromochloromethane	ug/m3			< 0.13 U	ND	< 0.085 U	ND	< 0.085 U	ND	< 0.085 U
Dichlorodifluoromethane	ug/m3	46	1500	**2.4**	**-0.2**	**2.4**	**-0.2**	**2.6**	**0**	**2.6**
Ethanol	ug/m3			**58 E**	**50.5**	**66 E**	**58.5**	**410 E**	**402.5**	< 7.5 U
Ethyl acetate	ug/m3	32	1100	< 7.2 U	ND	< 7.2 U	ND	< 7.2 U	ND	< 7.2 U
Isopropyl Alcohol	ug/m3	91		**96 E**	**87.4**	< 8.6 U	ND	**11**	**2.4**	< 8.6 U
Isopropylbenzene	ug/m3	180	6100	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U
m,p-Xylenes	ug/m3	46	1500	**1.7**	**0.83**	< 0.87 U	ND	< 0.87 U	ND	< 0.87 U
Methyl Methacrylate	ug/m3	320	11000	< 6.1 U	ND	< 4.1 U	ND	< 4.1 U	ND	< 4.1 U
Methyl tert-butyl ether (MTBE)	ug/m3	9.6	320	< 1.8 U	ND	< 1.8 U	ND	< 1.8 U	ND	< 1.8 U
Methylene Chloride	ug/m3	66	2200	**84 CE**	**25 CE**	< 35 U	**5 CE**	**64 CE**	**5 CE**	**59 CE**
n-Hexane	ug/m3	320	11000	< 3.5 U	ND	< 3.5 U	ND	< 3.5 U	ND	< 3.5 U
Nonane	ug/m3			< 5.2 U	ND	< 5.2 U	ND	< 5.2 U	ND	< 5.2 U
n-Propylbenzene	ug/m3	460	15000	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U
o-Xylene	ug/m3	46	1500	< 0.43 U	ND	< 0.43 U	ND	< 0.43 U	ND	< 0.43 U
Pentane	ug/m3	460		< 3 U	ND	< 3 U	ND	< 3 U	ND	< 3 U
Styrene	ug/m3	460	15000	< 0.85 U	ND	< 0.85 U	ND	< 0.85 U	ND	< 0.85 U
t-Butyl alcohol (TBA)	ug/m3			< 12 U	ND	< 12 U	ND	< 12 U	ND	< 12 U
Tetrachloroethene (PCE)	ug/m3	9.6	320	< 10 U	ND	< 6.8 U	ND	< 6.8 U	ND	< 6.8 U
Tetrahydrofuran	ug/m3	910	30000	< 0.3 U	ND	< 0.3 U	ND	< 0.3 U	ND	< 0.3 U
trans-1,2-Dichloroethene	ug/m3	18	610	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U	ND	< 0.4 U
trans-1,3-Dichloropropene	ug/m3			< 0.68 U	ND	< 0.45 U	ND	< 0.45 U	ND	< 0.45 U
Trichloroethene (TCE)	ug/m3	0.33	11	< 0.16 U	ND	< 0.11 U	ND	< 0.11 U	ND	< 0.11 U
Trichlorofluoromethane	ug/m3	320	11000	< 2.2 U	ND	< 2.2 U	ND	< 2.2 U	ND	< 2.2 U
Vinyl Acetate	ug/m3	91	3000	< 7 U	ND	< 7 U	ND	< 7 U	ND	< 7 U
Vinyl Bromide	ug/m3	0.17	5.6	< 0.44 U	ND	< 0.44 U	ND	< 0.44 U	ND	< 0.44 U
Vinyl Chloride	ug/m3	0.28	9.5	< 0.26 U	ND	< 0.26 U	ND	< 0.26 U	ND	< 0.26 U
1,3-Butadiene	ug/m3	0.083	2.8	**0.11**	**0.066**	**0.062**	**0.018**	< 0.044 U	ND	< 0.044 U
2,2,4-Trimethylpentane	ug/m3			< 7 U	ND	< 4.7 U	ND	< 4.7 U	ND	< 4.7 U
4-Ethyltoluene	ug/m3			< 2.5 U	ND	< 2.5 U	ND	< 2.5 U	ND	< 2.5 U
alpha-Chlorotoluene	ug/m3	0.051	1.7	< 0.052 U	ND	< 0.052 U	ND	< 0.052 U	ND	< 0.052 U
Freon 114	ug/m3			< 0.7 U	ND	< 0.7 U	ND	< 0.7 U	ND	< 0.7 U
Heptane	ug/m3	180	6100	< 6.1 U	ND	< 4.1 U	ND	< 4.1 U	ND	< 4.1 U
Other										
Helium	%			--	--	--	--	--	--	--

Bold - detected
Blue Shaded - Detected result or non-detected RL exceeded Indoor Air screening level
Orange Shaded - Detected result or non-detected RL exceeded Sub-Slab Soil Gas screening level
U - Analyte not detected at or above Reporting Limit (RL) shown
J - Result value estimated
UJ - Analyte not detected and the Reporting Limit (RL) is an estimate
E - Result exceeded calibration range. Result usable for qualitative analysis of analyte presence, but numeric valu
C - Result may be influenced by unconfirmed contamination as part of the analytical process.

This Page Intentionally Left Blank

FIGURES

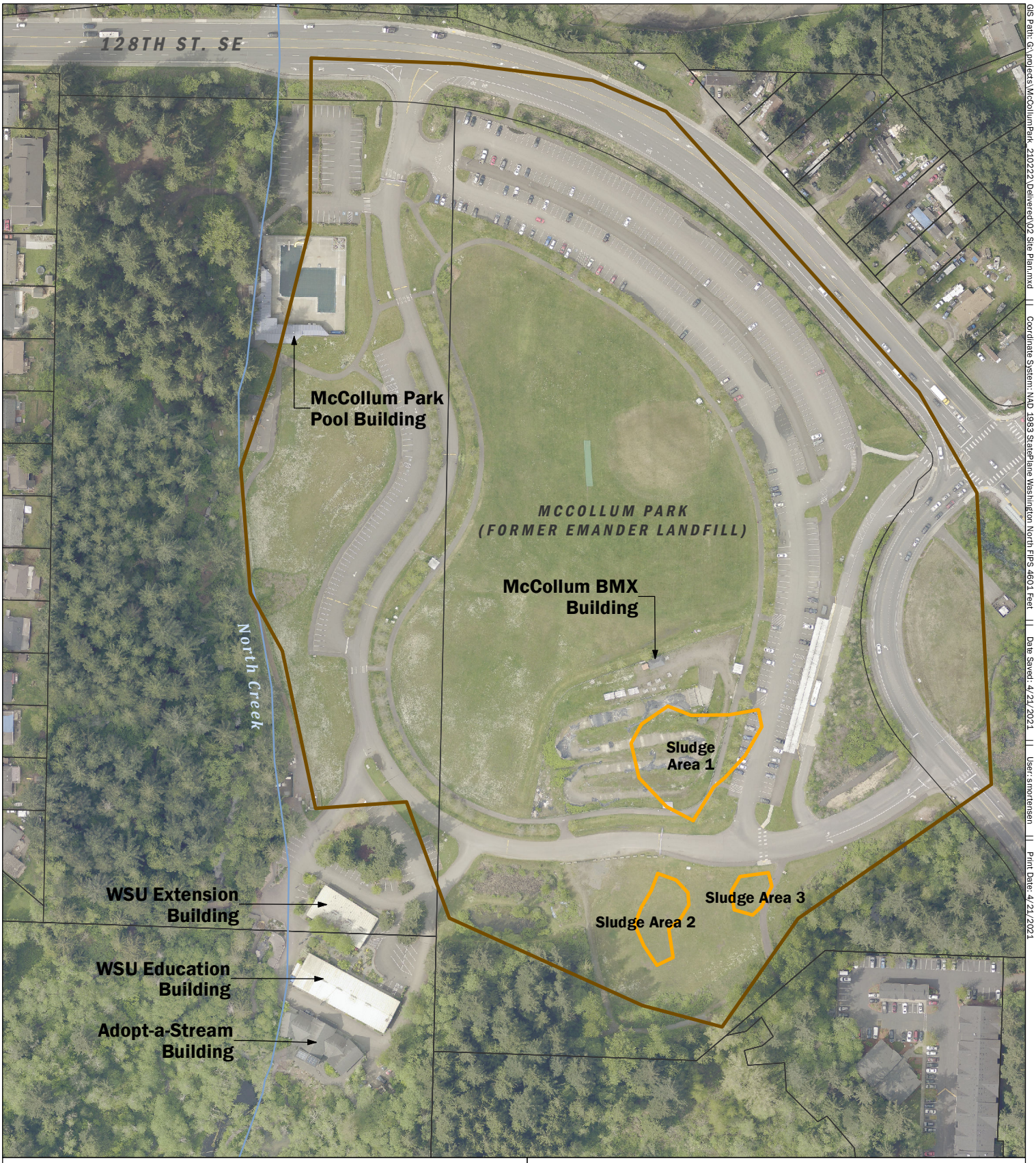


Site Location Map

Tier 2 Assessment Report
McCollum Park
600 128th St. SE, Everett, WA 98206

Aspect CONSULTING	APR-2021	BY: DM / SBM	FIGURE NO. 1
	PROJECT NO. 210222-01	REVISED BY: ---	

GIS Path: G:\projects\McCollumPark_210222\Delivered\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 4/21/2021 || User: smortensen || Print Date: 4/21/2021



Landfill Area

Sludge Area

Snohomish County Tax Parcel

N

0 200 400

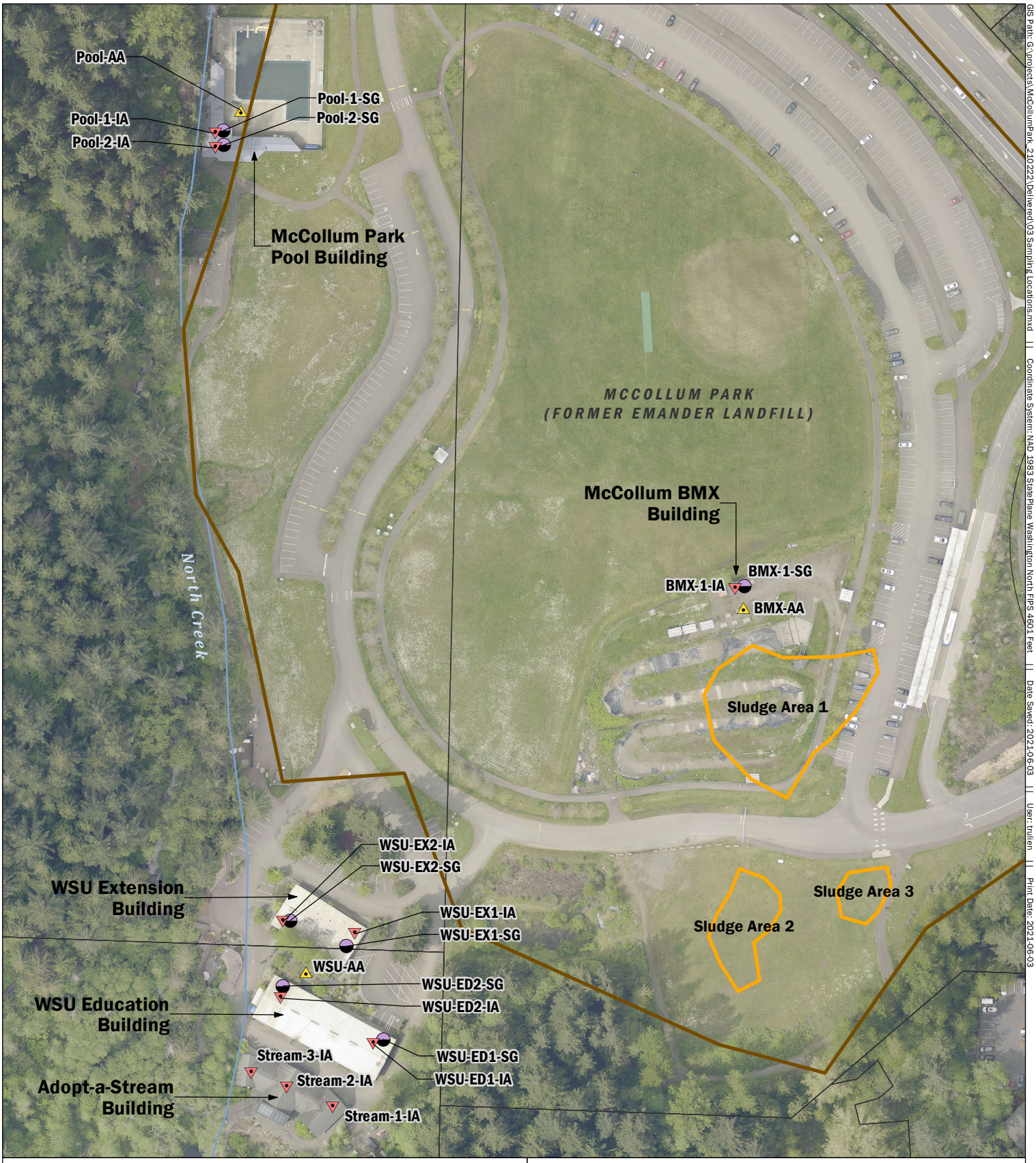
Feet

Site Plan

Tier 2 Assessment Report
McCollum Park
600 128th St. SE, Everett, WA 98206

Aspect Consulting	APR-2021	BY: DM / SBM	FIGURE NO. 2
	PROJECT NO. 210222-01	REVISED BY: ---	

GIS Path: G:\projects\McCollumPark_210222\Delivered\02 Site Plan.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 4/21/2021 || User: smortensen || Print Date: 4/21/2021



Ambient Air
Indoor Air
Soil Gas
Landfill Area
Sludge Area
Snohomish County Tax Parcel

Note: Site features are approximate.

N

0 150
Feet

Sampling Locations

Tier 2 Assessment Report
McCollum Park
600 128th St. SE, Everett, WA 98206

DRAFT

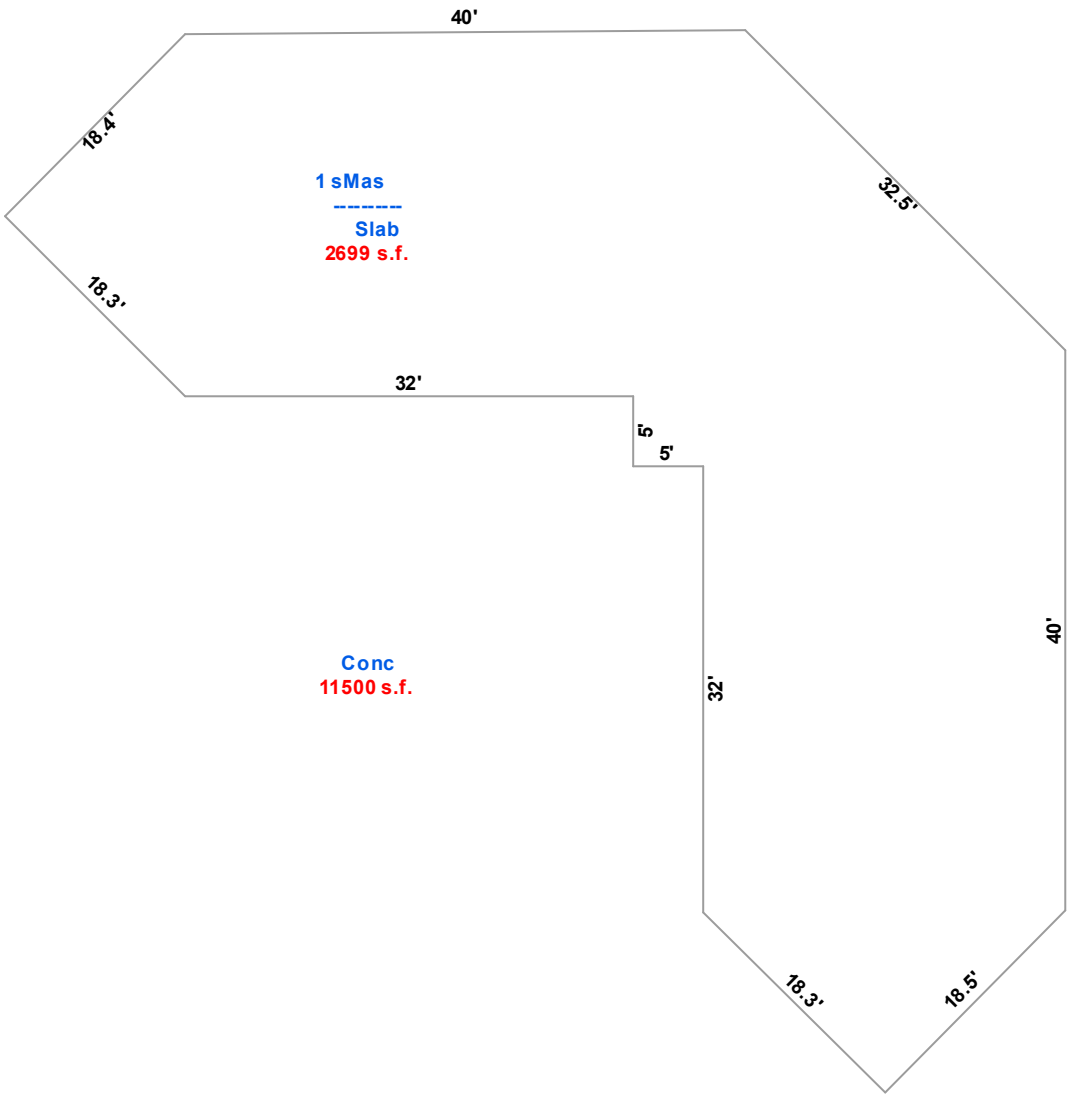
Aspect Consulting	JUN-2021	BY: DM / SBM	FIGURE NO. 3
	PROJECT NO. 210222-01	REVISED BY: TDR	

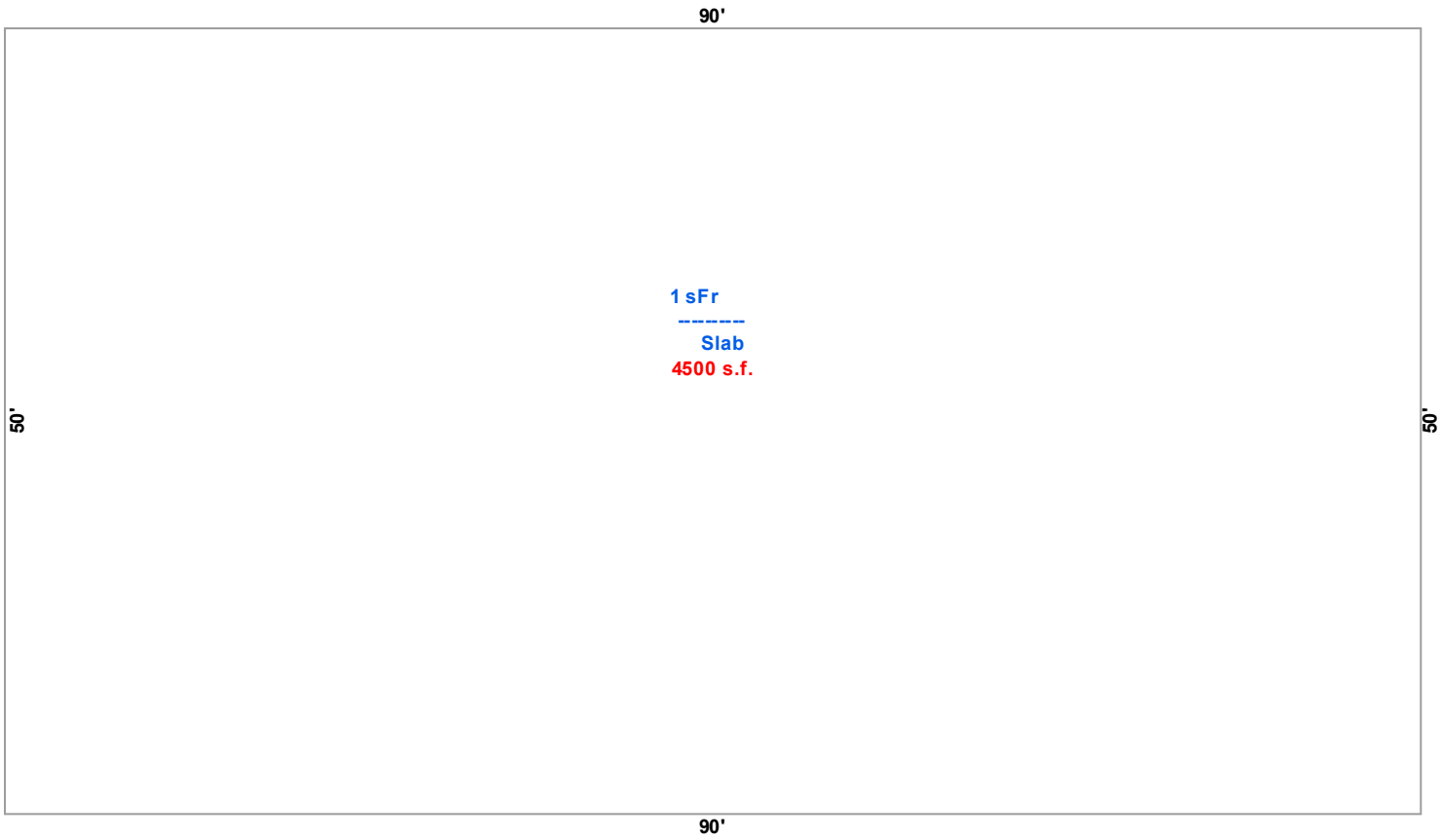
This Page Intentionally Left Blank

APPENDIX A

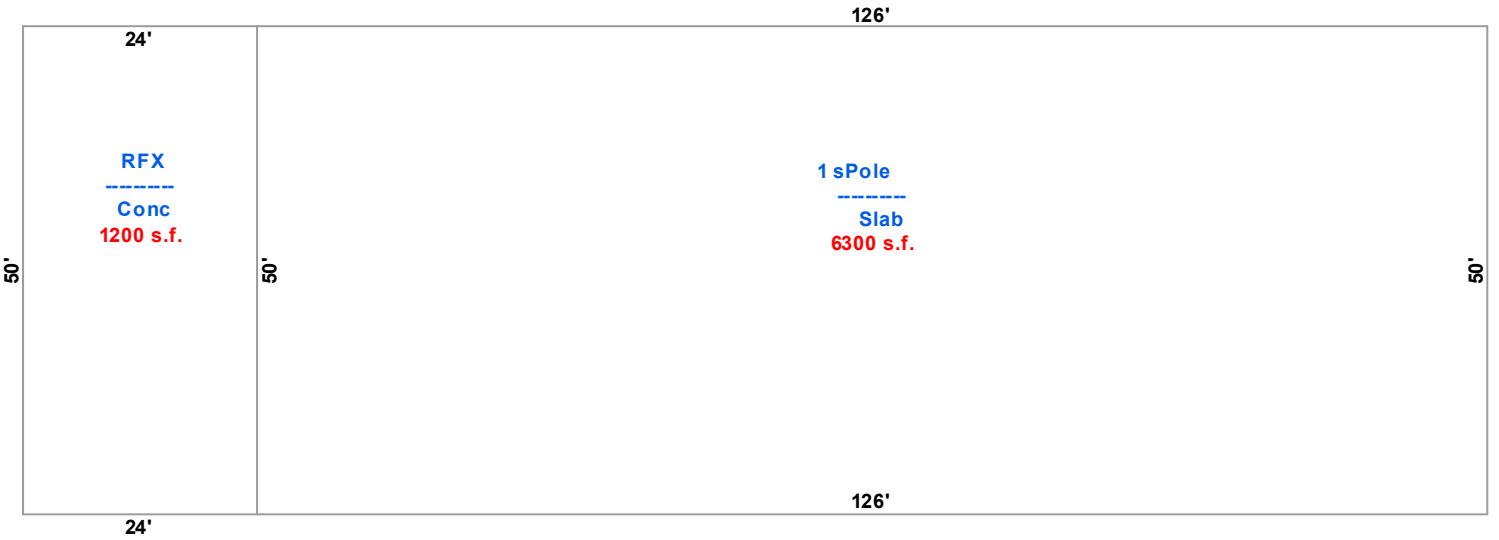
Building Floor Plans

McCollum Park



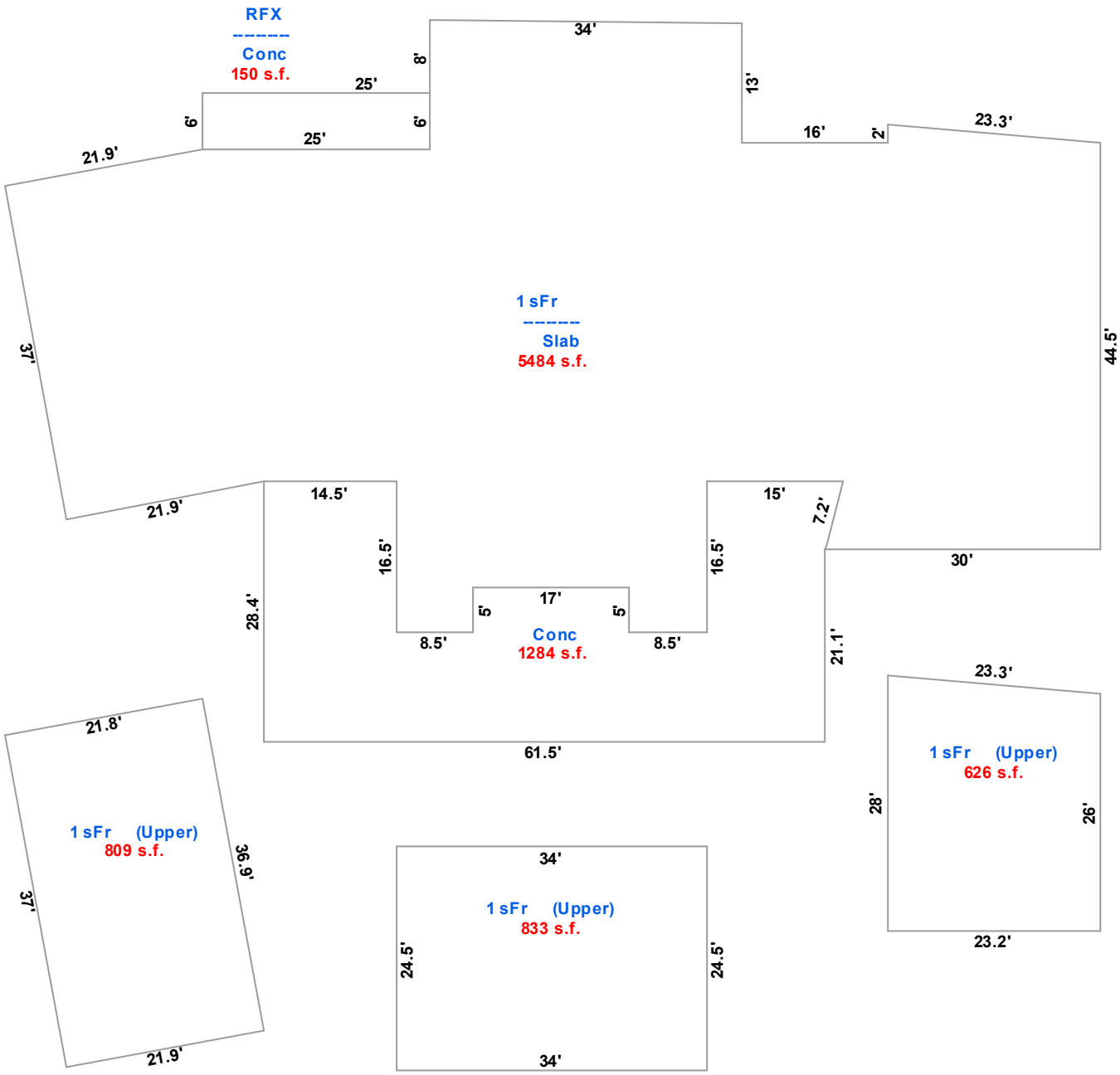


WSU Extension Office



WSU Ext Classroom

Adopt-a-Stream Foundation Bldg



APPENDIX B

Field Forms

Air Sample Collection Form

Project Name: McCollum Park Address: 600 128th St. SE Everett WA Aspect Project No.: 210222

Date: 4/26/21 Field Representative: Baxter Call

Completed Building Evaluation Form? Y

Provided Occupants with Pre-Sampling Instructions? Y

Photoionization Detector (Brand and Model): MiniRae Lite

Landfill Gas Meter (Brand and Model): GEM 5000

Weather Data

START		END	
Barometric Pressure (in Hg): 29.77		Barometric Pressure (in Hg): 30.01	
Wind Direction (from the): S		Wind Direction (from the): N	
Wind Speed (mph): 5		Wind Speed (mph): 5.5	
Temperature (deg F): 49		Temperature (deg F): 55	
Humidity (%): 86		Humidity (%): 73	
Precipitation (inches): 0		Precipitation (inches): 0	
Weather Description: Partly/Mostly Cloudy		Sunny	

Air Sample Name: Pool-AA-042621	Canister ID: 18565	Gauge/Controller ID: 06606	
Sample Type (check all that apply): [ ] Indoor [X] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Pool deck	**Sample Intake Height:** ~5'		

Sample Readings

START		END	
Date: 4/26/21		Date: 4/26/21	
Time: 0734		Time: 1534	
PID Reading (ppm): 0.0		PID Reading (ppm): 0.0	
Canister Vacuum (in Hg): ~~28.4~~ 28.5		Canister Vacuum (in Hg): 3	
CH_4 (% volume): 0.0		CH_4 (% volume): 0.0	
CO_2 (% volume): 0.1		CO_2 (% volume): 0.1	
O_2 (% volume): 20.3		O_2 (% volume): 20.7	
H_2S (% volume): 0		H_2S (% volume): 0	
Notes:			
HVAC operation/other ventilation considerations during sampling period: N/A			

Air Sample Name: Pool-I-IA-042621	Canister ID: 37212	Gauge/Controller ID: 07870	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Office Desk	**Sample Intake Height:** ~4'		

Sample Readings

START		END	
Date: 4/26/21		Date: 4/26/21	
Time: 0738		Time: 1537	
PID Reading (ppm): 0.0		PID Reading (ppm): 0.1	
Canister Vacuum (in Hg): 30		Canister Vacuum (in Hg): 7	
CH_4 (% volume): 0.0		CH_4 (% volume): 0.0	
CO_2 (% volume): 0.1		CO_2 (% volume): 0.1	
O_2 (% volume): 21.4		O_2 (% volume): 20.6	
H_2S (% volume): 0		H_2S (% volume): 0	
Notes:			
HVAC operation/other ventilation considerations during sampling period: No ~~ven~~ active ventilation.			

Aspect CONSULTING

Air Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: _____

Date: 4/26/21 Field Representative: Baxter Call

Completed Building Evaluation Form? _____

Provided Occupants with Pre-Sampling Instructions? _____

Photoionization Detector (Brand and Model): _____

Landfill Gas Meter (Brand and Model):

Weather Data	
START	**END**
Barometric Pressure (in Hg):	Barometric Pressure (in Hg):
Wind Direction (from the):	Wind Direction (from the):
Wind Speed (mph):	Wind Speed (mph):
Temperature (deg F):	Temperature (deg F):
Humidity (%):	Humidity (%):
Precipitation (inches):	Precipitation (inches):
Weather Description:	

Air Sample Name: Pool-2-IA-042621	Canister ID: 23230	Gauge/Controller ID: 05352	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Lobby countertop	**Sample Intake Height:** 5'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0745	Time: ~~0~~ 1541
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 29	Canister Vacuum (in Hg): 6
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.1
O_2 (% volume): 21.4	O_2 (% volume): 20.6
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: No active ventilation.	

Air Sample Name: Stream-1-IA-042621	Canister ID: 32100	Gauge/Controller ID: 06603	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Break room table	**Sample Intake Height:** ~4'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0805	Time: 1553
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 29	Canister Vacuum (in Hg): 7.5
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.1
O_2 (% volume): 20.7	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: HVAC not in room, forced air heat on at time of deployment.	

Aspect CONSULTING

Air Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: _____

Date: 4/26/21 Field Representative: Baxter Call

Completed Building Evaluation Form? _____

Provided Occupants with Pre-Sampling Instructions? _____

Photoionization Detector (Brand and Model): _____

Landfill Gas Meter (Brand and Model):

Weather Data	
START	**END**
Barometric Pressure (in Hg):	Barometric Pressure (in Hg):
Wind Direction (from the):	Wind Direction (from the):
Wind Speed (mph):	Wind Speed (mph):
Temperature (deg F):	Temperature (deg F):
Humidity (%):	Humidity (%):
Precipitation (inches):	Precipitation (inches):
Weather Description:	

Air Sample Name: Stream-2-IA-042621	Canister ID: 35331	Gauge/Controller ID: 06604	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Chair on auditorium floor	**Sample Intake Height:** ~3'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0811	Time: 1555
PID Reading (ppm): 0.0	PID Reading (ppm): 0.0
Canister Vacuum (in Hg): 30	Canister Vacuum (in Hg): 5
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 20.5	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: HVAC off.	

Air Sample Name: Stream-3-IA-042621	Canister ID: 20554	Gauge/Controller ID: 07849	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Gift Shop Checkout	**Sample Intake Height:** ~4'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0815	Time: 1557
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 28	Canister Vacuum (in Hg): 8
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.1
O_2 (% volume): 20.5	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: HVAC off.	

Aspect CONSULTING

Air Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: _____

Date: 4/26/21 Field Representative: Baxter Cali

Completed Building Evaluation Form? _____

Provided Occupants with Pre-Sampling Instructions? _____

Photoionization Detector (Brand and Model): _____

Landfill Gas Meter (Brand and Model):

Weather Data	
START	**END**
Barometric Pressure (in Hg):	Barometric Pressure (in Hg):
Wind Direction (from the):	Wind Direction (from the):
Wind Speed (mph):	Wind Speed (mph):
Temperature (deg F):	Temperature (deg F):
Humidity (%):	Humidity (%):
Precipitation (inches):	Precipitation (inches):
Weather Description:	

Air Sample Name: Stream-AA-042621	Canister ID: 18579	Gauge/Controller ID: 6660S
Sample Type (check all that apply): [ ] Indoor [ ] Outdoor	[X] Ambient or Background Source	[ ] Crawlspace [ ] Basement
Sample Location: Outdoor 1st story roof	**Sample Intake Height:** ~10'	

Sample Readings	
START	**END**
Date: 4/26/21	Date:
Time: 0825	Time: 1600
PID Reading (ppm): 0.0	PID Reading (ppm): 0.0
Canister Vacuum (in Hg): 30	Canister Vacuum (in Hg): 9
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 21.0	O_2 (% volume): 21.0
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: N/A	

Air Sample Name: WSO-AA-042621	Canister ID: 18566	Gauge/Controller ID: 08181
Sample Type (check all that apply): [ ] Indoor [ ] Outdoor	[X] Ambient or Background Source	[ ] Crawlspace [ ] Basement
Sample Location: Table outside intersection with bldg	**Sample Intake Height:** ~~~1'~~ ~4'	

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0850	Time: 1605
PID Reading (ppm): 0.0	PID Reading (ppm): 0.0
Canister Vacuum (in Hg): 31	Canister Vacuum (in Hg): 7
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.1
O_2 (% volume): 20.7	O_2 (% volume): 20.6
H_2S (% volume): 0.0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: N/A	

Aspect CONSULTING

Air Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: _____

Date: 4/26/21 Field Representative: Baxter Call

Completed Building Evaluation Form? _____

Provided Occupants with Pre-Sampling Instructions? _____

Photoionization Detector (Brand and Model): _____

Landfill Gas Meter (Brand and Model):

Weather Data	
START	**END**
Barometric Pressure (in Hg):	Barometric Pressure (in Hg):
Wind Direction (from the):	Wind Direction (from the):
Wind Speed (mph):	Wind Speed (mph):
Temperature (deg F):	Temperature (deg F):
Humidity (%):	Humidity (%):
Precipitation (inches):	Precipitation (inches):
Weather Description:	

Air Sample Name: WSU-Ex1-IA-042621	Canister ID: 20552	Gauge/Controller ID: 05353	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: NW office desk	**Sample Intake Height:** ~5'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0837	Time: 1602
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 30	Canister Vacuum (in Hg): 9
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 20.8	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: No ventilation	

Air Sample Name: WSU-Ex2-IA-042621	Canister ID: 20544	Gauge/Controller ID: 06607	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: SE corner office desk	**Sample Intake Height:** ~4'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0840	Time: 1610
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 29	Canister Vacuum (in Hg): 8.5
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 21.0	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: No ventilation.	

Aspect CONSULTING

Air Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: _____

Date: 4/26/21 Field Representative: Baxter Call

Completed Building Evaluation Form? _____

Provided Occupants with Pre-Sampling Instructions? _____

Photoionization Detector (Brand and Model): _____

Landfill Gas Meter (Brand and Model):

Weather Data	
START	**END**
Barometric Pressure (in Hg):	Barometric Pressure (in Hg):
Wind Direction (from the):	Wind Direction (from the):
Wind Speed (mph):	Wind Speed (mph):
Temperature (deg F):	Temperature (deg F):
Humidity (%):	Humidity (%):
Precipitation (inches):	Precipitation (inches):
Weather Description:	

Air Sample Name: WSU-Ed1-IA-042621	Canister ID: 18573	Gauge/Controller ID: 05183	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Cougar Classroom table	**Sample Intake Height:** ~3'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0845	Time: 1621
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 31	Canister Vacuum (in Hg): 9
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 6.0
O_2 (% volume): 20.9	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	

HVAC operation/other ventilation considerations during sampling period: AC/Heater units on.

Air Sample Name: WSU-Ed2-IA-042621	Canister ID: 18572	Gauge/Controller ID: 05350	
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace	[ ] Basement
Sample Location: Evergreen classroom table	**Sample Intake Height:** ~3'		

Sample Readings	
START	**END**
Date: 4/26/21	Date: ~~4/26/20~~ 4/26/21
Time: 0850	Time: 1618
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 29	Canister Vacuum (in Hg): 9
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 21.0	O_2 (% volume): 20.9
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	

HVAC operation/other ventilation considerations during sampling period: No ventilation.

Aspect CONSULTING

Air Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: _____

Date: 4/26/21 Field Representative: Baxter Call

Completed Building Evaluation Form? _____

Provided Occupants with Pre-Sampling Instructions? _____

Photoionization Detector (Brand and Model): _____

Landfill Gas Meter (Brand and Model):

Weather Data	
START	**END**
Barometric Pressure (in Hg):	Barometric Pressure (in Hg):
Wind Direction (from the):	Wind Direction (from the):
Wind Speed (mph):	Wind Speed (mph):
Temperature (deg F):	Temperature (deg F):
Humidity (%):	Humidity (%):
Precipitation (inches):	Precipitation (inches):
Weather Description:	

Air Sample Name: BMX-1-IA-042621	Canister ID: 20542	Gauge/Controller ID: 07853
Sample Type (check all that apply): [X] Indoor [ ] Outdoor	[ ] Ambient or Background Source	[ ] Crawlspace [ ] Basement
Sample Location: BMX office on counter	**Sample Intake Height:** ~4'	

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0857	Time: 1629
PID Reading (ppm): 0.0	PID Reading (ppm): 0.1
Canister Vacuum (in Hg): 29	Canister Vacuum (in Hg): -7.5
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 20.5	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: No ventilation	

Air Sample Name: BMX-AA-042621	Canister ID: 18580	Gauge/Controller ID: 05349
Sample Type (check all that apply): [ ] Indoor [ ] Outdoor	[X] Ambient or Background Source	[ ] Crawlspace [ ] Basement
Sample Location: Picnic table outside BMX bike	**Sample Intake Height:** ~3'	

Sample Readings	
START	**END**
Date: 4/26/21	Date: 4/26/21
Time: 0900	Time: 1632
PID Reading (ppm): 0.0	PID Reading (ppm): 0.0
Canister Vacuum (in Hg): 29	Canister Vacuum (in Hg): 8
CH_4 (% volume): 0.0	CH_4 (% volume): 0.0
CO_2 (% volume): 0.1	CO_2 (% volume): 0.0
O_2 (% volume): 20.7	O_2 (% volume): 20.7
H_2S (% volume): 0	H_2S (% volume): 0
Notes:	
HVAC operation/other ventilation considerations during sampling period: N/A	

Aspect CONSULTING

Soil Gas Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: 210222

Date: 4/27/21 Field Representative: Baxter Gall

Brand and Model of Field Meters Used:

Photoionization Detector: Mini Rae Lite

Multi-Gas Meter: GEM 5000

Helium Meter: Dielectric

BMX-1-SG-042721

Soil Gas Sample Name: ~~BMX-SG-042~~			Cannister ID: 3312			Gauge/Controller ID: 305		
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness: 4")			[ ] Shallow Soil Gas (< 15 feet)			[ ] Deep Soil Gas (> 15 feet)		
Barometric Pressure: 29.62 inches Hg and (rising)/(falling)			**Subsurface Pressure:** 0 inches wc					
Shut-In Vacuum Test Readings			**Final Purge Readings**					
START	Time: 0602	Vacuum (inches Hg): 15	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)	
END	Time: 0613	Vacuum (inches Hg): 15	0.4	0.0	0.2	20.0	0	

Sampling Readings

START		Sample Time Interval	END	
Helium Shroud: (Y) N 20 (%)		Start: 0615	Helium Shroud: (Y) N 26 (%)	
Canister Vacuum (inches Hg): 30		End: 0620	Canister Vacuum (inches Hg): 5	
CH_4 (% volume): 0.0			CH_4 (% volume): 0.0	
CO_2 (% volume): 0.2			CO_2 (% volume): 0.2	
O_2 (% volume): 20.0			O_2 (% volume): 20.0	
H_2S (% volume): 0.0			H_2S (% volume): 0.0	

Notes: In middle of slab in BMX building

Soil Gas Sample Name: Pool-1-SG-042721			Cannister ID: 3669			Gauge ID: 302		
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness: 8")			[ ] Shallow Soil Gas (< 15 feet)			[ ] Deep Soil Gas (> 15 feet)		
Barometric Pressure: 29.65 inches Hg and (rising)/(falling)			**Subsurface Pressure:** 0.0 inches wc					
Shut-In Vacuum Test Readings			**Final Purge Readings**					
START	Time: 0700	Vacuum (inches Hg): 16	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)	
END	Time: 0705	Vacuum (inches Hg): 15	0.4	0.0	0.6	18.6	0	

Sampling Readings

START		Sample Time Interval	END	
Helium Shroud: (Y) N 25 (%)		Start: 0710	Helium Shroud: (Y) N 20 (%)	
Canister Vacuum (inches Hg): 29		End: 0714	Canister Vacuum (inches Hg):	
CH_4 (% volume): 0.0			CH_4 (% volume): 0.0	
CO_2 (% volume): 0.6			CO_2 (% volume): 0.6	
O_2 (% volume): 18.6			O_2 (% volume): 18.6	
H_2S (% volume): 0.0			H_2S (% volume): 0.0	

Notes: In pool building office.

Aspect CONSULTING

Soil Gas Sample Collection Form

Project Name: McCallum Park Address: _____ Aspect Project No.: 210222

Date: 4/27/21 Field Representative: Baxter Call.

Brand and Model of Field Meters Used:

Photoionization Detector: _____

Multi-Gas Meter: _____

Helium Meter: _____

Soil Gas Sample Name: Pool-2-SG-042721			Cannister ID: 3540		Gauge/Controller ID: 244		
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness: 3)			[ ] Shallow Soil Gas (< 15 feet)		[ ] Deep Soil Gas (> 15 feet)		
Barometric Pressure: 29.68 inches Hg and (rising)/(falling)			Subsurface Pressure: 0.0 inches wc				
Shut-In Vacuum Test Readings			**Final Purge Readings**				
START	Time: 0735	Vacuum (inches Hg): 14/5	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)
END	Time: 0740	Vacuum (inches Hg): 15	0.7	0.0	0.8	19.4	0

Sampling Readings		
START	Sample Time Interval	END
Helium Shroud: (Y) N 30.5 (%)	Start: 0741	Helium Shroud: (Y) N 25.2 (%)
Canister Vacuum (inches Hg): 30	End: 0746	Canister Vacuum (inches Hg): 5
CH_4 (% volume): 0.0		CH_4 (% volume): 0.0
CO_2 (% volume): 0.8		CO_2 (% volume): 0.7
O_2 (% volume): 19.7		O_2 (% volume): 19.7
H_2S (% volume): 0		H_2S (% volume): 0

Notes: In pool building lobby.

Soil Gas Sample Name: WSU-Ex1-SG-042721			Cannister ID: 3445		Gauge ID: 301		
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness: 3)			[ ] Shallow Soil Gas (< 15 feet)		[ ] Deep Soil Gas (> 15 feet)		
Barometric Pressure: 29.68 inches Hg and (rising)/(falling)			Subsurface Pressure: 0.0 inches wc				
Shut-In Vacuum Test Readings			**Final Purge Readings**				
START	Time: 0830	Vacuum (inches Hg): 15	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)
END	Time: 0835	Vacuum (inches Hg): 13	0.6	0.0	0.4	19.8	0

Sampling Readings		
START	Sample Time Interval	END
Helium Shroud: (Y) N 20 (%)	Start: 0837	Helium Shroud: (Y) N 20 (%)
Canister Vacuum (inches Hg): 29	End: 0842	Canister Vacuum (inches Hg): 5
CH_4 (% volume): 0.0		CH_4 (% volume): 0.0
CO_2 (% volume): 0.4		CO_2 (% volume): 0.4
O_2 (% volume): 19.8		O_2 (% volume): 19.8
H_2S (% volume): 0		H_2S (% volume): 0

Notes: Collected in WSU Extension building in electrical / computer storage room. ~~NW~~ NE corner of bldg.

Aspect CONSULTING

Soil Gas Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: 210222

Date: 4/27/21 Field Representative: Baxter Cain

Brand and Model of Field Meters Used:

Photoionization Detector: _____

Multi-Gas Meter: _____

Helium Meter: _____

Soil Gas Sample Name: WSU-Ex2-SG-042721			Cannister ID: 3230			Gauge/Controller ID: 243		
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness: 3)			[ ] Shallow Soil Gas (< 15 feet)			[ ] Deep Soil Gas (> 15 feet)		
Barometric Pressure: 29.68 inches Hg and (rising)/(falling)			**Subsurface Pressure:** 0.0 inches wc					
Shut-In Vacuum Test Readings			**Final Purge Readings**					
START	Time: 0915	Vacuum (inches Hg): 15	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)	
END	Time: 0920	Vacuum (inches Hg): 15	0.7	0.0	0.6	19.5	0	

Sampling Readings			
START	**Sample Time Interval**	**END**	
Helium Shroud: (Y) N 20 (%)	Start: 0925	Helium Shroud: (Y) N 20 (%)	
Canister Vacuum (inches Hg): 29	End: 0930	Canister Vacuum (inches Hg): 5	
CH_4 (% volume): 0.0		CH_4 (% volume): 0.0	
CO_2 (% volume): 0.6		CO_2 (% volume): 0.7	
O_2 (% volume): 19.5		O_2 (% volume): 19.5	
H_2S (% volume): 0		H_2S (% volume): 0	

Notes: Collected outside office in SE corner of WSU extension building SW

Soil Gas Sample Name: WSU-Ed1-SG-042721			Cannister ID: 2439			Gauge ID: 259		
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness:)			[ ] Shallow Soil Gas (< 15 feet)			[ ] Deep Soil Gas (> 15 feet)		
Barometric Pressure: 29.68 inches Hg and (rising)/(falling)			**Subsurface Pressure:** 0.0 inches wc					
Shut-In Vacuum Test Readings			**Final Purge Readings**					
START	Time: 1010	Vacuum (inches Hg): 15	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)	
END	Time: 1015	Vacuum (inches Hg): 14	0.7	0.0	0.0	20.2	0	

Sampling Readings			
START	**Sample Time Interval**	**END**	
Helium Shroud: (Y) N 20.5 (%)	Start: 1020	Helium Shroud: (Y) N 20 (%)	
Canister Vacuum (inches Hg): 30	End: 1025	Canister Vacuum (inches Hg): 5	
CH_4 (% volume): 0.0		CH_4 (% volume): 0.0	
CO_2 (% volume): 0.0		CO_2 (% volume): 0.0	
O_2 (% volume): 20.2		O_2 (% volume): 20.2	
H_2S (% volume): 0		H_2S (% volume): 0	

Notes: Collected in center of cougar room at WSU education building.

Aspect CONSULTING

Soil Gas Sample Collection Form

Project Name: McCollum Park Address: _____ Aspect Project No.: 210222

Date: 4/27/21 Field Representative: Baxter Call

Brand and Model of Field Meters Used:

Photoionization Detector: _____

Multi-Gas Meter: _____

Helium Meter: _____

Soil Gas Sample Name: WSU-ED2-SG-042721			Canister ID: 2439				Gauge/Controller ID: 304
Sample Type: [X] Sub Slab Soil Gas (Slab Thickness:)			[ ] Shallow Soil Gas (< 15 feet)				[ ] Deep Soil Gas (> 15 feet)
Barometric Pressure: 29.68 inches Hg and (rising)/(falling)			Subsurface Pressure: 0 inches wc				
Shut-In Vacuum Test Readings			**Final Purge Readings**				
START	Time: 1047	Vacuum (inches Hg): 17	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)
END	Time: 1052	Vacuum (inches Hg): 15	0.8	0.0	0.0	20.3	0

Sampling Readings

START		Sample Time Interval	END	
Helium Shroud: (Y) N 28 (%)		Start: 1056	Helium Shroud: (Y) N 20 (%)	
Canister Vacuum (inches Hg): 29		End: 1101	Canister Vacuum (inches Hg): 5	
CH_4 (% volume): 0.0			CH_4 (% volume): 0.0	
CO_2 (% volume): 0.0			CO_2 (% volume): 0.0	
O_2 (% volume): 20.3			O_2 (% volume): 20.2	
H_2S (% volume): 0			H_2S (% volume): 0	

Notes: Collected in center of Evergreen classroom in WSU education building.

Soil Gas Sample Name:			Cannister ID:				Gauge ID:
Sample Type: [ ] Sub Slab Soil Gas (Slab Thickness:)			[ ] Shallow Soil Gas (< 15 feet)				[ ] Deep Soil Gas (> 15 feet)
Barometric Pressure: inches Hg and (rising)/(falling)			Subsurface Pressure: inches wc				
Shut-In Vacuum Test Readings			**Final Purge Readings**				
START	Time:	Vacuum (inches Hg):	PID (ppm)	CH_4 (%LEL)	CO_2 (%)	O_2 (%)	He (%)
END	Time:	Vacuum (inches Hg):					

Sampling Readings

START		Sample Time Interval	END	
Helium Shroud: Y N (%)		Start:	Helium Shroud: Y N (%)	
Canister Vacuum (inches Hg):		End:	Canister Vacuum (inches Hg):	
CH_4 (% volume):			CH_4 (% volume):	
CO_2 (% volume):			CO_2 (% volume):	
O_2 (% volume):			O_2 (% volume):	
H_2S (% volume):			H_2S (% volume):	

Notes:

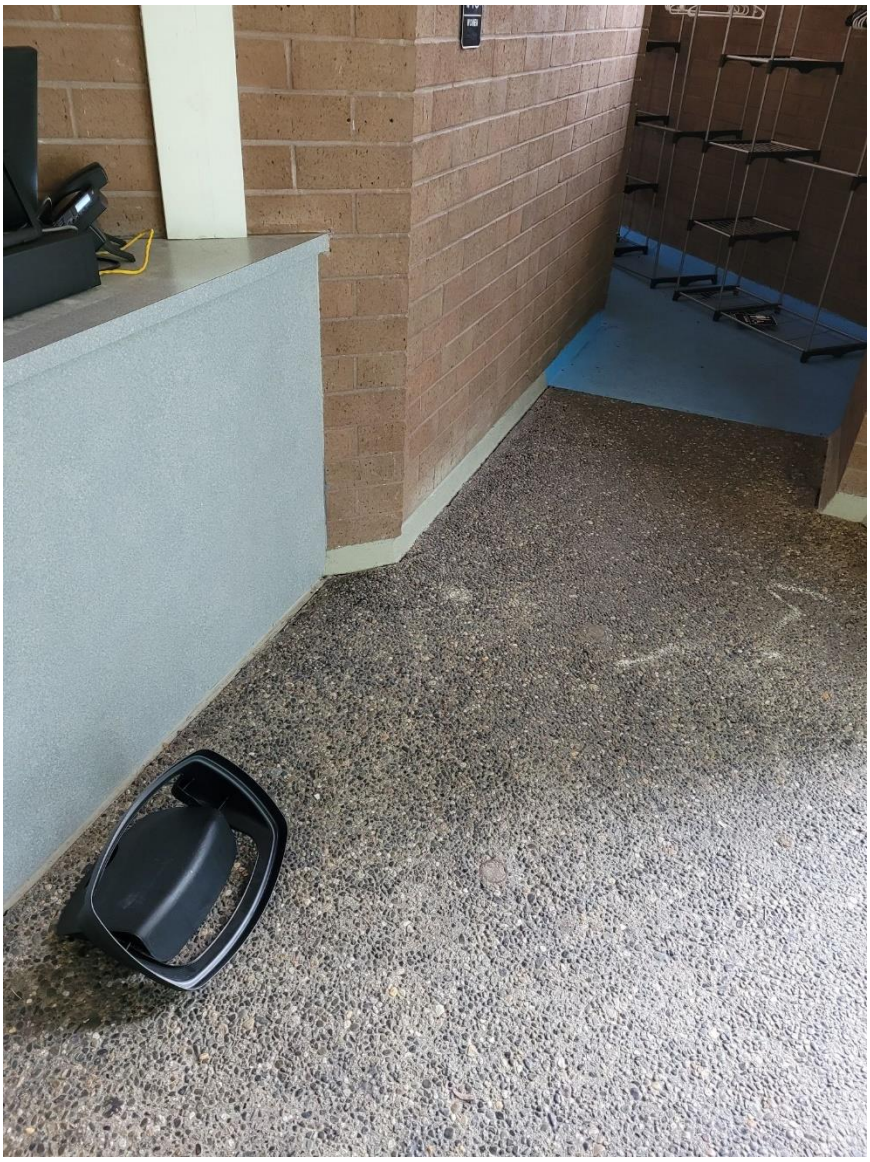
Aspect CONSULTING

This Page Intentionally Left Blank

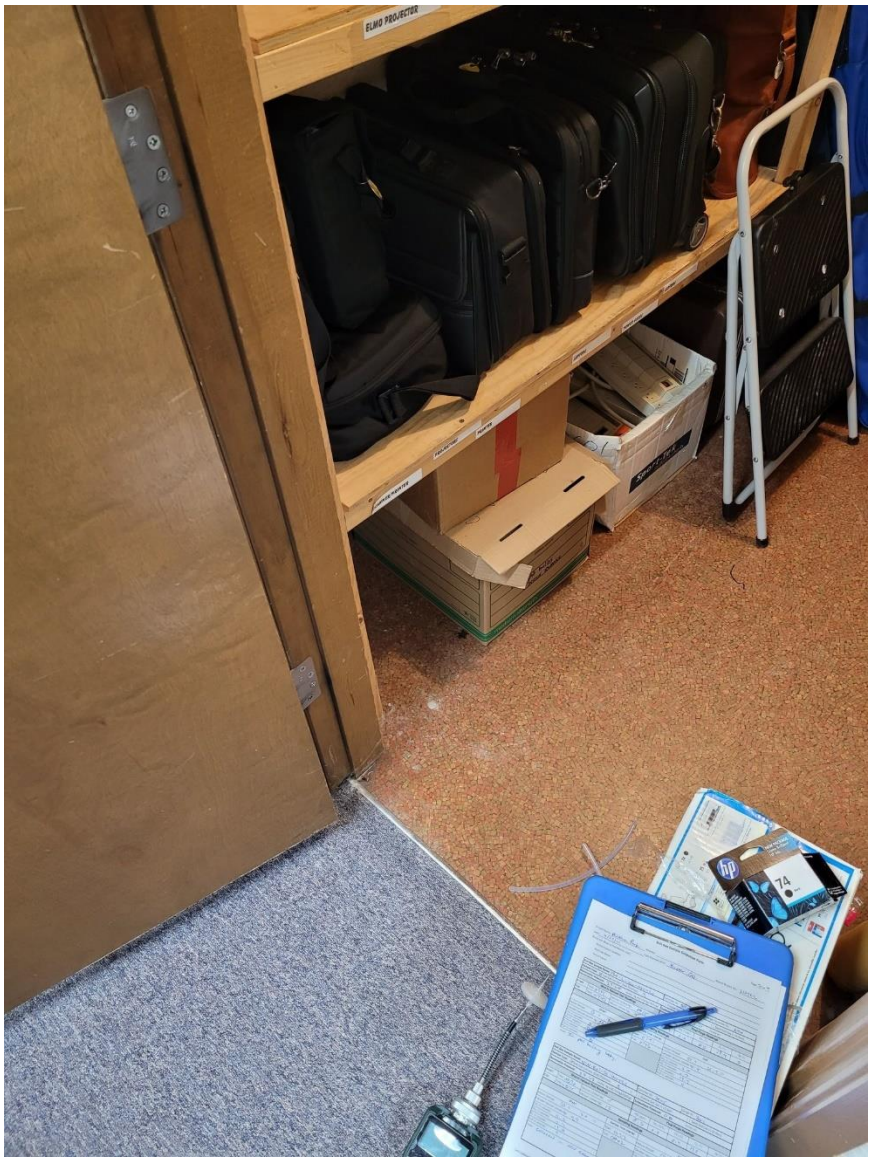
APPENDIX C

Photo Log

Photograph 1. McCollum Pool Building Office sampling location.



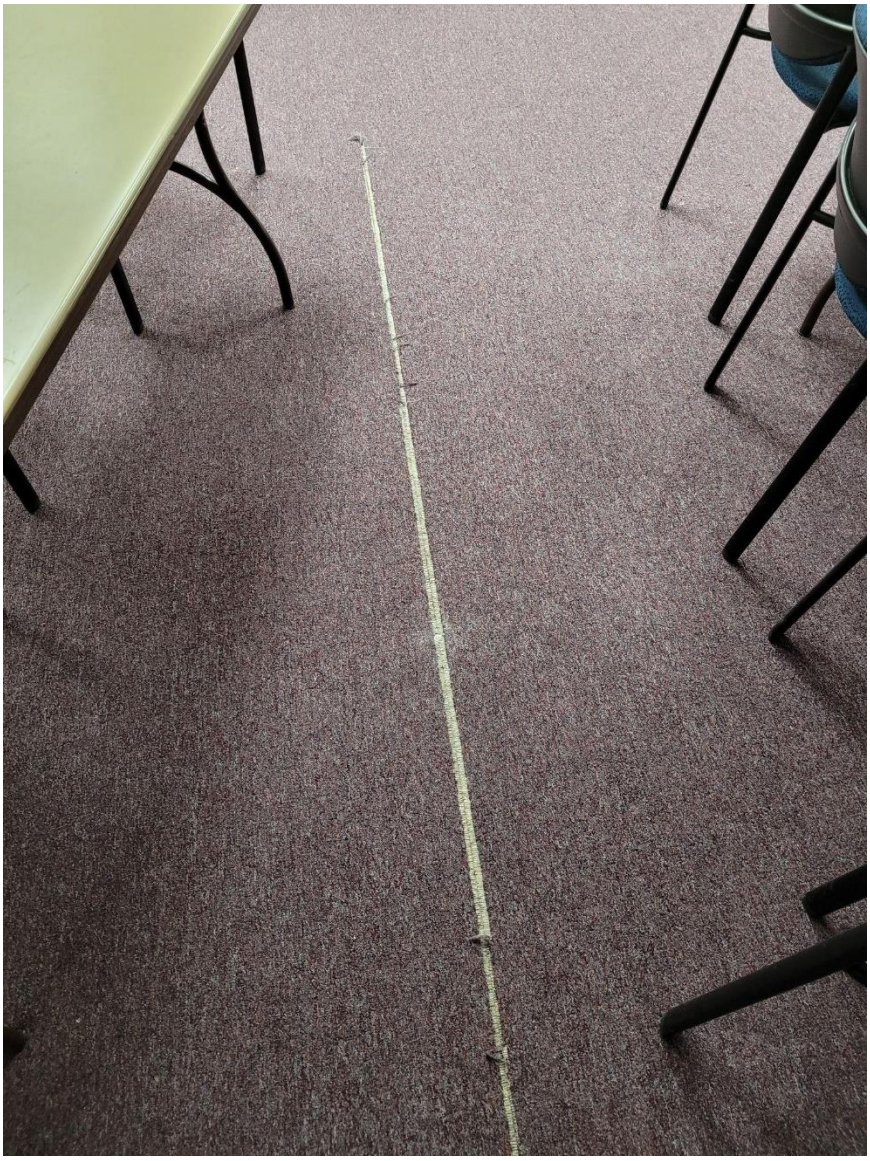
Photograph 2. McCollum Pool Building Lobby sampling location.



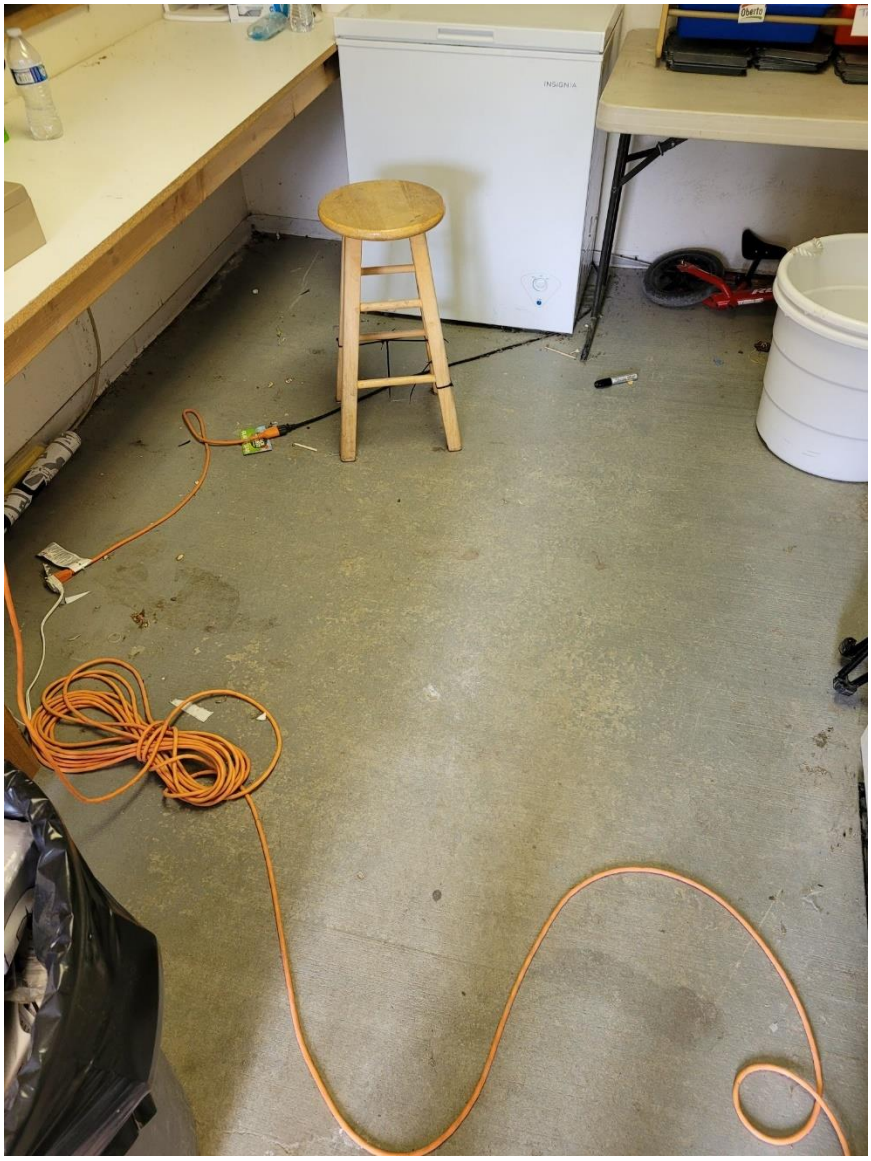
Photograph 3. WSU Extension Building northeast office sampling location.

Photograph 4. WSU Extension Building northeast office sampling location.

Photograph 5. WSU Education Building Cougar Classroom sampling location.



Photograph 6. WSU Education Building Evergreen Classroom sampling location.



Photograph 7. BMX Building sampling location.

This Page Intentionally Left Blank

APPENDIX D

Laboratory Analytical Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

May 11, 2021

Delia Massey, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Ms Massey:

Included are the results from the testing of material submitted on April 27, 2021 from the McCollum Park 210222, F&BI 104488 project. There are 61 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data, Peter Banister
ASP0511R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 27, 2021 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC McCollum Park 210222, F&BI 104488 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
104488 -01	Pool-AA-042621
104488 -02	Pool-1-IA-042621
104488 -03	Pool-2-IA-042621
104488 -04	Stream-1-IA-042621
104488 -05	Stream-2-IA-042621
104488 -06	Stream-3-IA-042621
104488 -07	Stream-AA-042621
104488 -08	WSU-AA-042621
104488 -09	WSU-Ex1-IA-042621
104488 -10	WSU-Ex2-IA-042621
104488 -11	WSU-Ed1-IA-042621
104488 -12	WSU-Ed2-IA-042621
104488 -13	BMX-1-IA-042621
104488 -14	BMX-AA-042621
104488 -15	BMX-1-SG-042721
104488 -16	Pool-1-SG-042721
104488 -17	Pool-2-SG-042721
104488 -18	WSU-Ex1-SG-042721
104488 -19	WSU-Ex2-SG-042721
104488 -20	WSU-Ed1-SG-042721
104488 -21	WSU-Ed2-SG-042721

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

Several TO15 compounds exceeded the calibration range. The data were qualified accordingly. In addition, the TO15 methylene chloride detections were qualified as due to laboratory contamination.

Naphthalene by TO15 was reported below the lowest calibration sample in several samples. The data were qualified accordingly.

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Pool-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-01
Date Analyzed:	04/30/21	Data File:	043012.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	120
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Pool-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-02
Date Analyzed:	04/30/21	Data File:	043013.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	390
APH EC9-12 aliphatics	36
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Pool-2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-03
Date Analyzed:	04/30/21	Data File:	043014.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	370
APH EC9-12 aliphatics	25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Stream-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-04
Date Analyzed:	04/30/21	Data File:	043015.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	130
APH EC9-12 aliphatics	67
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Stream-2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-05
Date Analyzed:	04/30/21	Data File:	043016.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	100
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Stream-3-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-06
Date Analyzed:	04/30/21	Data File:	043017.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	87	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	120
APH EC9-12 aliphatics	36
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Stream-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-07
Date Analyzed:	05/01/21	Data File:	043018.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	100
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-08
Date Analyzed:	05/01/21	Data File:	043019.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	85
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ex1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-09
Date Analyzed:	05/01/21	Data File:	043020.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	120
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ex2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-10
Date Analyzed:	05/01/21	Data File:	043021.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	130
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ed1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-11
Date Analyzed:	05/01/21	Data File:	043022.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	170
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ed2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-12
Date Analyzed:	05/01/21	Data File:	043023.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	150
APH EC9-12 aliphatics	150
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	BMX-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-13
Date Analyzed:	05/01/21	Data File:	043024.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	88	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	130
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	BMX-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-14
Date Analyzed:	05/01/21	Data File:	043025.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	88	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	110
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	BMX-1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-15 1/5.2
Date Analyzed:	04/28/21	Data File:	042825.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	560
APH EC9-12 aliphatics	<130
APH EC9-10 aromatics	<130

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Pool-1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-16 1/5.6
Date Analyzed:	04/29/21	Data File:	042826.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	800
APH EC9-12 aliphatics	260
APH EC9-10 aromatics	<140

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Pool-2-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-17 1/5.5
Date Analyzed:	04/29/21	Data File:	042827.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	890
APH EC9-12 aliphatics	280
APH EC9-10 aromatics	<140

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ex1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-18 1/5.9
Date Analyzed:	04/29/21	Data File:	042828.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	530
APH EC9-12 aliphatics	<150
APH EC9-10 aromatics	<150

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ex2-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-19 1/8.5
Date Analyzed:	04/29/21	Data File:	042831.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	730
APH EC9-12 aliphatics	<210
APH EC9-10 aromatics	<210

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ed1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-20 1/5.5
Date Analyzed:	04/29/21	Data File:	042829.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	520
APH EC9-12 aliphatics	150
APH EC9-10 aromatics	<140

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	WSU-Ed2-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-21 1/5.7
Date Analyzed:	04/29/21	Data File:	042830.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	510
APH EC9-12 aliphatics	<140
APH EC9-10 aromatics	<140

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	McCollum Park 210222
Date Collected:	Not Applicable	Lab ID:	01-858 MB
Date Analyzed:	04/30/21	Data File:	043011.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	McCollum Park 210222
Date Collected:	Not Applicable	Lab ID:	01-849 MB
Date Analyzed:	04/28/21	Data File:	042816.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<75
APH EC9-12 aliphatics	<25
APH EC9-10 aromatics	<25

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pool-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-01
Date Analyzed:	04/30/21	Data File:	043012.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.6	0.53	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	0.22	0.097	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	7.2	3.0	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	74 ve lc	21 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.088	0.018	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.073	0.018	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.44	0.070	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.089 j	0.017 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pool-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-02
Date Analyzed:	04/30/21	Data File:	043013.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.8	0.56	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	4.4	1.1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	110 ve	45 ve	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	50 ve ca	27 ve ca	Toluene	29	7.7
Acrolein	0.54	0.23	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	28	9.4	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	2.2	0.51
Methylene chloride	50 lc	14 lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	8.8	2.0
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	2.8	0.64
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	7.5	2.1	Bromoform	<2.1	<0.2
Chloroform	0.14	0.029	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	5.7	1.2
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.077	0.019	1,4-Dichlorobenzene	1.1	0.19
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.46	0.073	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	3.6	1.1	Naphthalene	0.57	0.11
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pool-2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-03
Date Analyzed:	04/30/21	Data File:	043014.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.6	0.52	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	4.8	1.2
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	120 ve	49 ve	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	64 ve ca	34 ve ca	Toluene	28	7.4
Acrolein	0.37	0.16	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	28	9.5	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	2.3	0.52
Methylene chloride	61 ve lc	17 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	9.2	2.1
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	3.0	0.68
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	7.6	2.2	Bromoform	<2.1	<0.2
Chloroform	0.14	0.028	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	5.7	1.2
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.077	0.019	1,4-Dichlorobenzene	0.84	0.14
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.46	0.073	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	3.7	1.2	Naphthalene	0.55	0.10
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Stream-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-04 1/1.5
Date Analyzed:	05/06/21	Data File:	050616.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<1.8	<1	1,2-Dichloropropane	<0.35	<0.075
Dichlorodifluoromethane	2.3	0.46	1,4-Dioxane	<0.54	<0.15
Chloromethane	<5.6	<2.7	2,2,4-Trimethylpentane	<7	<1.5
F-114	<1	<0.15	Methyl methacrylate	<6.1	<1.5
Vinyl chloride	<0.38	<0.15	Heptane	<6.1	<1.5
1,3-Butadiene	0.070	0.031	Bromodichloromethane	<0.1	<0.015
Butane	<7.1	<3	Trichloroethene	<0.16	<0.03
Bromomethane	<3.5	<0.9	cis-1,3-Dichloropropene	<0.68	<0.15
Chloroethane	<4	<1.5	4-Methyl-2-pentanone	<6.1	<1.5
Vinyl bromide	<0.66	<0.15	trans-1,3-Dichloropropene	<0.68	<0.15
Ethanol	58 ve	31 ve	Toluene	<28	<7.5
Acrolein	1.1	0.46	1,1,2-Trichloroethane	<0.082	<0.015
Pentane	<4.4	<1.5	2-Hexanone	<6.1	<1.5
Trichlorofluoromethane	<3.4	<0.6	Tetrachloroethene	<10	<1.5
Acetone	20	8.6	Dibromochloromethane	<0.13	<0.015
2-Propanol	87 ve	35 ve	1,2-Dibromoethane (EDB)	<0.12	<0.015
1,1-Dichloroethene	<0.59	<0.15	Chlorobenzene	<0.69	<0.15
trans-1,2-Dichloroethene	<0.59	<0.15	Ethylbenzene	<0.65	<0.15
Methylene chloride	84 ve lc	24 ve lc	1,1,2,2-Tetrachloroethane	<0.21	<0.03
t-Butyl alcohol (TBA)	<18	<6	Nonane	<7.9	<1.5
3-Chloropropene	<2.3	<0.75	Isopropylbenzene	<3.7	<0.75
CFC-113	<1.1	<0.15	2-Chlorotoluene	<7.8	<1.5
Carbon disulfide	<9.3	<3	Propylbenzene	<3.7	<0.75
Methyl t-butyl ether (MTBE)	<2.7	<0.75	4-Ethyltoluene	<3.7	<0.75
Vinyl acetate	<11	<3	m,p-Xylene	1.7	0.40
1,1-Dichloroethane	<0.61	<0.15	o-Xylene	<0.65	<0.15
cis-1,2-Dichloroethene	<0.59	<0.15	Styrene	<1.3	<0.3
Hexane	<5.3	<1.5	Bromoform	<3.1	<0.3
Chloroform	0.27	0.055	Benzyl chloride	<0.078	<0.015
Ethyl acetate	<11	<3	1,3,5-Trimethylbenzene	<3.7	<0.75
Tetrahydrofuran	<0.44	<0.15	1,2,4-Trimethylbenzene	<3.7	<0.75
2-Butanone (MEK)	<4.4	<1.5	1,3-Dichlorobenzene	<0.9	<0.15
1,2-Dichloroethane (EDC)	0.10	0.025	1,4-Dichlorobenzene	<0.35	<0.057
1,1,1-Trichloroethane	<0.82	<0.15	1,2-Dichlorobenzene	<0.9	<0.15
Carbon tetrachloride	0.52	0.082	1,2,4-Trichlorobenzene	<1.1	<0.15
Benzene	<0.48	<0.15	Naphthalene	0.26	0.05
Cyclohexane	<10	<3	Hexachlorobutadiene	<0.8	<0.08

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Stream-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-04
Date Analyzed:	04/30/21	Data File:	043015.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23 J	<0.05 J
Dichlorodifluoromethane	2.4	0.48	1,4-Dioxane	<0.36 J	<0.1 J
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7 J	<1 J
F-114	<0.7	<0.1	Methyl methacrylate	<4.1 J	<1 J
Vinyl chloride	<0.26	<0.1	Heptane	<4.1 J	<1 J
1,3-Butadiene	0.11	0.051	Bromodichloromethane	<0.067 J	<0.01 J
Butane	<4.8	<2	Trichloroethene	<0.11 J	<0.02 J
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45 J	<0.1 J
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1 J	<1 J
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45 J	<0.1 J
Ethanol	54 ve ca	29 ve ca	Toluene	<19 J	<5 J
Acrolein	0.91	0.39	1,1,2-Trichloroethane	<0.055 J	<0.01 J
Pentane	<3	<1	2-Hexanone	<4.1 J	<1 J
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8 J	<1 J
Acetone	19	7.9	Dibromochloromethane	<0.085 J	<0.01 J
2-Propanol	96 ve	39 ve	1,2-Dibromoethane (EDB)	<0.077 J	<0.01 J
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	78 ve lc	22 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	1.3	0.29
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.27	0.056	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.10	0.025	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.47	0.074	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.2	0.038
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Stream-2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-05
Date Analyzed:	04/30/21	Data File:	043016.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.4	0.48	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	0.062	0.028	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	66 ve ca	35 ve ca	Toluene	<19	<5
Acrolein	0.61	0.27	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	7.2	3.0	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.12	0.024	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.077	0.019	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.45	0.072	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.21	0.04
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Stream-3-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-06
Date Analyzed:	04/30/21	Data File:	043017.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	88	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.6	0.52	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	410 ve ca	220 ve ca	Toluene	<19	<5
Acrolein	0.82	0.36	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	13	5.3	Dibromochloromethane	<0.085	<0.01
2-Propanol	11	4.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	64 ve lc	18 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.093	0.019	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.085	0.021	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.47	0.075	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.13	0.024
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Stream-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-07
Date Analyzed:	05/01/21	Data File:	043018.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.6	0.53	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	0.14	0.063	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	5.0	2.1	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	59 ve lc	17 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.078	0.016	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.077	0.019	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.46	0.073	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.057 j	<0.011 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-08
Date Analyzed:	05/01/21	Data File:	043019.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.8	0.56	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	0.12	0.054	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	5.6	2.3	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	73 ve lc	21 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.083	0.017	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.081	0.020	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.45	0.071	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.057 j	<0.011 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ex1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-09
Date Analyzed:	05/01/21	Data File:	043020.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.7	0.54	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	0.069	0.031	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	30 ve ca	16 ve ca	Toluene	<19	<5
Acrolein	0.37	0.16	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	6.6	2.8	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.13	0.027	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.22	0.055	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.45	0.072	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.24	0.045
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ex2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-10
Date Analyzed:	05/01/21	Data File:	043021.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.4	0.48	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	42 ve ca	22 ve ca	Toluene	<19	<5
Acrolein	0.45	0.19	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	9.4	4.0	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	73 ve lc	21 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.20	0.041	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.15	0.036	1,4-Dichlorobenzene	0.23	0.039
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.45	0.071	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.34	0.065
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ed1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-11
Date Analyzed:	05/01/21	Data File:	043022.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.5	0.51	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	14 ca	7.5 ca	Toluene	<19	<5
Acrolein	0.41	0.18	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	4.7	1.6	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	7.0	2.9	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	1.1	0.24
Methylene chloride	130 ve lc	37 ve lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	4.0	0.92
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	1.3	0.29
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.098	0.020	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	0.89	0.30	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.089	0.022	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.45	0.072	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	1.0	0.31	Naphthalene	0.14	0.027
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ed2-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-12
Date Analyzed:	05/01/21	Data File:	043023.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.9	0.58	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	21 ca	11 ca	Toluene	<19	<5
Acrolein	0.50	0.22	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	6.2	2.1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	6.0	2.5	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	1.5	0.34
Methylene chloride	47 lc	14 lc	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	5.9	1.4
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	1.8	0.42
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.11	0.022	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	0.95	0.32	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.077	0.019	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.46	0.073	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	1.4	0.43	Naphthalene	0.33	0.063
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	BMX-1-IA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-13
Date Analyzed:	05/01/21	Data File:	043024.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	16	3.3	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	0.51	0.22	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	6.5	1.2	Tetrachloroethene	<6.8	<1
Acetone	9.7	4.1	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	61 ve	18 ve	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.078	0.016	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.077	0.019	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.45	0.072	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	0.079 j	0.015 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	BMX-AA-042621	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-14
Date Analyzed:	05/01/21	Data File:	043025.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	2.7	0.54	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	0.16	0.071	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	6.2	2.6	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	64 ve	18 ve	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	0.078	0.016	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	0.065	0.016	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	0.46	0.073	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.057 j	<0.011 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	BMX-1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-15 1/5.2
Date Analyzed:	04/28/21	Data File:	042825.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	90	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<6.3	<3.6	1,2-Dichloropropane	<1.2	<0.26
Dichlorodifluoromethane	3.2	0.64	1,4-Dioxane	<1.9	<0.52
Chloromethane	<19	<9.4	2,2,4-Trimethylpentane	<24	<5.2
F-114	<3.6	<0.52	Methyl methacrylate	<21	<5.2
Vinyl chloride	<1.3	<0.52	Heptane	<21	<5.2
1,3-Butadiene	<0.23	<0.1	Bromodichloromethane	<0.35	<0.052
Butane	<25	<10	Trichloroethene	<0.56	<0.1
Bromomethane	<12	<3.1	cis-1,3-Dichloropropene	<2.4	<0.52
Chloroethane	<14	<5.2	4-Methyl-2-pentanone	<21	<5.2
Vinyl bromide	<2.3	<0.52	trans-1,3-Dichloropropene	<2.4	<0.52
Ethanol	<39	<21	Toluene	<98	<26
Acrolein	<0.6	<0.26	1,1,2-Trichloroethane	<0.28	<0.052
Pentane	<15	<5.2	2-Hexanone	<21	<5.2
Trichlorofluoromethane	<12	<2.1	Tetrachloroethene	<35	<5.2
Acetone	46	19	Dibromochloromethane	<0.44	<0.052
2-Propanol	<45	<18	1,2-Dibromoethane (EDB)	<0.4	<0.052
1,1-Dichloroethene	<2.1	<0.52	Chlorobenzene	<2.4	<0.52
trans-1,2-Dichloroethene	<2.1	<0.52	Ethylbenzene	<2.3	<0.52
Methylene chloride	190 lc	56 lc	1,1,2,2-Tetrachloroethane	<0.71	<0.1
t-Butyl alcohol (TBA)	<63	<21	Nonane	<27	<5.2
3-Chloropropene	<8.1	<2.6	Isopropylbenzene	<13	<2.6
CFC-113	<4	<0.52	2-Chlorotoluene	<27	<5.2
Carbon disulfide	<32	<10	Propylbenzene	<13	<2.6
Methyl t-butyl ether (MTBE)	<9.4	<2.6	4-Ethyltoluene	<13	<2.6
Vinyl acetate	<37	<10	m,p-Xylene	<4.5	<1
1,1-Dichloroethane	<2.1	<0.52	o-Xylene	<2.3	<0.52
cis-1,2-Dichloroethene	<2.1	<0.52	Styrene	<4.4	<1
Hexane	<18	<5.2	Bromoform	<11	<1
Chloroform	0.30	0.062	Benzyl chloride	<0.27	<0.052
Ethyl acetate	<37	<10	1,3,5-Trimethylbenzene	<13	<2.6
Tetrahydrofuran	12	4.0	1,2,4-Trimethylbenzene	<13	<2.6
2-Butanone (MEK)	<15	<5.2	1,3-Dichlorobenzene	<3.1	<0.52
1,2-Dichloroethane (EDC)	<0.21	<0.052	1,4-Dichlorobenzene	<1.2	<0.2
1,1,1-Trichloroethane	<2.8	<0.52	1,2-Dichlorobenzene	<3.1	<0.52
Carbon tetrachloride	<1.6	<0.26	1,2,4-Trichlorobenzene	<3.9	<0.52
Benzene	<1.7	<0.52	Naphthalene	<1.4	<0.26
Cyclohexane	<36	<10	Hexachlorobutadiene	<2.8	<0.26

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pool-1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-16 1/5.6
Date Analyzed:	04/29/21	Data File:	042826.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<6.7	<3.9	1,2-Dichloropropane	<1.3	<0.28
Dichlorodifluoromethane	<2.8	<0.56	1,4-Dioxane	<2	<0.56
Chloromethane	<21	<10	2,2,4-Trimethylpentane	<26	<5.6
F-114	<3.9	<0.56	Methyl methacrylate	<23	<5.6
Vinyl chloride	<1.4	<0.56	Heptane	<23	<5.6
1,3-Butadiene	<0.25	<0.11	Bromodichloromethane	1.5	0.23
Butane	<27	<11	Trichloroethene	<0.6	<0.11
Bromomethane	<13	<3.4	cis-1,3-Dichloropropene	<2.5	<0.56
Chloroethane	<15	<5.6	4-Methyl-2-pentanone	<23	<5.6
Vinyl bromide	<2.4	<0.56	trans-1,3-Dichloropropene	<2.5	<0.56
Ethanol	520 ve	270 ve	Toluene	<110	<28
Acrolein	1.3	0.55	1,1,2-Trichloroethane	<0.31	<0.056
Pentane	<17	<5.6	2-Hexanone	<23	<5.6
Trichlorofluoromethane	<13	<2.2	Tetrachloroethene	<38	<5.6
Acetone	380 ve	160 ve	Dibromochloromethane	<0.48	<0.056
2-Propanol	130	52	1,2-Dibromoethane (EDB)	<0.43	<0.056
1,1-Dichloroethene	<2.2	<0.56	Chlorobenzene	<2.6	<0.56
trans-1,2-Dichloroethene	<2.2	<0.56	Ethylbenzene	<2.4	<0.56
Methylene chloride	670 ve lc	190 ve lc	1,1,2,2-Tetrachloroethane	<0.77	<0.11
t-Butyl alcohol (TBA)	<68	<22	Nonane	<29	<5.6
3-Chloropropene	<8.8	<2.8	Isopropylbenzene	<14	<2.8
CFC-113	<4.3	<0.56	2-Chlorotoluene	<29	<5.6
Carbon disulfide	<35	<11	Propylbenzene	<14	<2.8
Methyl t-butyl ether (MTBE)	<10	<2.8	4-Ethyltoluene	<14	<2.8
Vinyl acetate	<39	<11	m,p-Xylene	8.1	1.9
1,1-Dichloroethane	<2.3	<0.56	o-Xylene	3.5	0.81
cis-1,2-Dichloroethene	<2.2	<0.56	Styrene	<4.8	<1.1
Hexane	<20	<5.6	Bromoform	<12	<1.1
Chloroform	46	9.4	Benzyl chloride	<0.29	<0.056
Ethyl acetate	<40	<11	1,3,5-Trimethylbenzene	<14	<2.8
Tetrahydrofuran	17	5.7	1,2,4-Trimethylbenzene	<14	<2.8
2-Butanone (MEK)	<17	<5.6	1,3-Dichlorobenzene	<3.4	<0.56
1,2-Dichloroethane (EDC)	<0.23	<0.056	1,4-Dichlorobenzene	<1.3	<0.21
1,1,1-Trichloroethane	<3.1	<0.56	1,2-Dichlorobenzene	<3.4	<0.56
Carbon tetrachloride	<1.8	<0.28	1,2,4-Trichlorobenzene	<4.2	<0.56
Benzene	2.8	0.87	Naphthalene	<1.5	<0.28
Cyclohexane	<39	<11	Hexachlorobutadiene	<3	<0.28

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Pool-2-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-17 1/5.5
Date Analyzed:	04/29/21	Data File:	042827.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<6.6	<3.8	1,2-Dichloropropane	<1.3	<0.28
Dichlorodifluoromethane	3.0	0.62	1,4-Dioxane	<2	<0.55
Chloromethane	<20	<9.9	2,2,4-Trimethylpentane	<26	<5.5
F-114	<3.8	<0.55	Methyl methacrylate	<23	<5.5
Vinyl chloride	<1.4	<0.55	Heptane	<23	<5.5
1,3-Butadiene	<0.24	<0.11	Bromodichloromethane	<0.37	<0.055
Butane	<26	<11	Trichloroethene	<0.59	<0.11
Bromomethane	<13	<3.3	cis-1,3-Dichloropropene	<2.5	<0.55
Chloroethane	<15	<5.5	4-Methyl-2-pentanone	<23	<5.5
Vinyl bromide	<2.4	<0.55	trans-1,3-Dichloropropene	<2.5	<0.55
Ethanol	49	26	Toluene	<100	<27
Acrolein	<0.63	<0.28	1,1,2-Trichloroethane	<0.3	<0.055
Pentane	<16	<5.5	2-Hexanone	<23	<5.5
Trichlorofluoromethane	<12	<2.2	Tetrachloroethene	<37	<5.5
Acetone	830 ve	350 ve	Dibromochloromethane	<0.47	<0.055
2-Propanol	<47	<19	1,2-Dibromoethane (EDB)	<0.42	<0.055
1,1-Dichloroethene	<2.2	<0.55	Chlorobenzene	<2.5	<0.55
trans-1,2-Dichloroethene	<2.2	<0.55	Ethylbenzene	<2.4	<0.55
Methylene chloride	<190	<55	1,1,2,2-Tetrachloroethane	<0.76	<0.11
t-Butyl alcohol (TBA)	<67	<22	Nonane	<29	<5.5
3-Chloropropene	<8.6	<2.7	Isopropylbenzene	<14	<2.7
CFC-113	<4.2	<0.55	2-Chlorotoluene	<28	<5.5
Carbon disulfide	<34	<11	Propylbenzene	<14	<2.7
Methyl t-butyl ether (MTBE)	<9.9	<2.7	4-Ethyltoluene	<14	<2.7
Vinyl acetate	<39	<11	m,p-Xylene	8.0	1.8
1,1-Dichloroethane	<2.2	<0.55	o-Xylene	4.2	0.96
cis-1,2-Dichloroethene	<2.2	<0.55	Styrene	<4.7	<1.1
Hexane	<19	<5.5	Bromoform	<11	<1.1
Chloroform	2.6	0.52	Benzyl chloride	<0.28	<0.055
Ethyl acetate	<40	<11	1,3,5-Trimethylbenzene	<14	<2.7
Tetrahydrofuran	15	5.2	1,2,4-Trimethylbenzene	<14	<2.7
2-Butanone (MEK)	<16	<5.5	1,3-Dichlorobenzene	<3.3	<0.55
1,2-Dichloroethane (EDC)	<0.22	<0.055	1,4-Dichlorobenzene	<1.3	<0.21
1,1,1-Trichloroethane	<3	<0.55	1,2-Dichlorobenzene	<3.3	<0.55
Carbon tetrachloride	<1.7	<0.28	1,2,4-Trichlorobenzene	<4.1	<0.55
Benzene	<1.8	<0.55	Naphthalene	<1.4	<0.28
Cyclohexane	<38	<11	Hexachlorobutadiene	<3	<0.28

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ex1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-18 1/5.9
Date Analyzed:	04/29/21	Data File:	042828.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<7.1	<4.1	1,2-Dichloropropane	<1.4	<0.29
Dichlorodifluoromethane	<2.9	<0.59	1,4-Dioxane	<2.1	<0.59
Chloromethane	<22	<11	2,2,4-Trimethylpentane	<28	<5.9
F-114	<4.1	<0.59	Methyl methacrylate	<24	<5.9
Vinyl chloride	<1.5	<0.59	Heptane	<24	<5.9
1,3-Butadiene	<0.26	<0.12	Bromodichloromethane	<0.4	<0.059
Butane	<28	<12	Trichloroethene	<0.63	<0.12
Bromomethane	<14	<3.5	cis-1,3-Dichloropropene	<2.7	<0.59
Chloroethane	<16	<5.9	4-Methyl-2-pentanone	<24	<5.9
Vinyl bromide	<2.6	<0.59	trans-1,3-Dichloropropene	<2.7	<0.59
Ethanol	<44	<24	Toluene	<110	<29
Acrolein	<0.68	<0.29	1,1,2-Trichloroethane	<0.32	<0.059
Pentane	<17	<5.9	2-Hexanone	<24	<5.9
Trichlorofluoromethane	<13	<2.4	Tetrachloroethene	<40	<5.9
Acetone	75	31	Dibromochloromethane	<0.5	<0.059
2-Propanol	66	27	1,2-Dibromoethane (EDB)	<0.45	<0.059
1,1-Dichloroethene	<2.3	<0.59	Chlorobenzene	<2.7	<0.59
trans-1,2-Dichloroethene	<2.3	<0.59	Ethylbenzene	<2.6	<0.59
Methylene chloride	<200	<59	1,1,2,2-Tetrachloroethane	<0.81	<0.12
t-Butyl alcohol (TBA)	<72	<24	Nonane	<31	<5.9
3-Chloropropene	<9.2	<2.9	Isopropylbenzene	<15	<2.9
CFC-113	<4.5	<0.59	2-Chlorotoluene	<31	<5.9
Carbon disulfide	<37	<12	Propylbenzene	<15	<2.9
Methyl t-butyl ether (MTBE)	<11	<2.9	4-Ethyltoluene	<15	<2.9
Vinyl acetate	<42	<12	m,p-Xylene	<5.1	<1.2
1,1-Dichloroethane	<2.4	<0.59	o-Xylene	<2.6	<0.59
cis-1,2-Dichloroethene	<2.3	<0.59	Styrene	<5	<1.2
Hexane	<21	<5.9	Bromoform	<12	<1.2
Chloroform	0.52	0.11	Benzyl chloride	<0.31	<0.059
Ethyl acetate	<43	<12	1,3,5-Trimethylbenzene	<15	<2.9
Tetrahydrofuran	12	4.1	1,2,4-Trimethylbenzene	<15	<2.9
2-Butanone (MEK)	<17	<5.9	1,3-Dichlorobenzene	<3.5	<0.59
1,2-Dichloroethane (EDC)	<0.24	<0.059	1,4-Dichlorobenzene	<1.4	<0.22
1,1,1-Trichloroethane	<3.2	<0.59	1,2-Dichlorobenzene	<3.5	<0.59
Carbon tetrachloride	<1.9	<0.29	1,2,4-Trichlorobenzene	<4.4	<0.59
Benzene	<1.9	<0.59	Naphthalene	<1.5	<0.29
Cyclohexane	<41	<12	Hexachlorobutadiene	<3.1	<0.3

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ex2-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-19 1/8.5
Date Analyzed:	04/29/21	Data File:	042831.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<10	<5.9	1,2-Dichloropropane	<2	<0.42
Dichlorodifluoromethane	<4.2	<0.85	1,4-Dioxane	<3.1	<0.85
Chloromethane	<32	<15	2,2,4-Trimethylpentane	<40	<8.5
F-114	<5.9	<0.85	Methyl methacrylate	<35	<8.5
Vinyl chloride	<2.2	<0.85	Heptane	<35	<8.5
1,3-Butadiene	<0.38	<0.17	Bromodichloromethane	<0.57	<0.085
Butane	<40	<17	Trichloroethene	<0.91	<0.17
Bromomethane	<20	<5.1	cis-1,3-Dichloropropene	<3.9	<0.85
Chloroethane	<22	<8.5	4-Methyl-2-pentanone	<35	<8.5
Vinyl bromide	<3.7	<0.85	trans-1,3-Dichloropropene	<3.9	<0.85
Ethanol	<64	<34	Toluene	<160	<42
Acrolein	<0.97	<0.42	1,1,2-Trichloroethane	<0.46	<0.085
Pentane	<25	<8.5	2-Hexanone	<35	<8.5
Trichlorofluoromethane	<19	<3.4	Tetrachloroethene	<58	<8.5
Acetone	<40	<17	Dibromochloromethane	<0.72	<0.085
2-Propanol	<73	<30	1,2-Dibromoethane (EDB)	<0.65	<0.085
1,1-Dichloroethene	<3.4	<0.85	Chlorobenzene	<3.9	<0.85
trans-1,2-Dichloroethene	<3.4	<0.85	Ethylbenzene	<3.7	<0.85
Methylene chloride	<300	<85	1,1,2,2-Tetrachloroethane	<1.2	<0.17
t-Butyl alcohol (TBA)	<100	<34	Nonane	<45	<8.5
3-Chloropropene	<13	<4.2	Isopropylbenzene	<21	<4.2
CFC-113	<6.5	<0.85	2-Chlorotoluene	<44	<8.5
Carbon disulfide	<53	<17	Propylbenzene	<21	<4.2
Methyl t-butyl ether (MTBE)	<15	<4.2	4-Ethyltoluene	<21	<4.2
Vinyl acetate	<60	<17	m,p-Xylene	<7.4	<1.7
1,1-Dichloroethane	<3.4	<0.85	o-Xylene	<3.7	<0.85
cis-1,2-Dichloroethene	<3.4	<0.85	Styrene	<7.2	<1.7
Hexane	<30	<8.5	Bromoform	<18	<1.7
Chloroform	1.0	0.21	Benzyl chloride	<0.44	<0.085
Ethyl acetate	<61	<17	1,3,5-Trimethylbenzene	<21	<4.2
Tetrahydrofuran	12	3.9	1,2,4-Trimethylbenzene	<21	<4.2
2-Butanone (MEK)	<25	<8.5	1,3-Dichlorobenzene	<5.1	<0.85
1,2-Dichloroethane (EDC)	<0.34	<0.085	1,4-Dichlorobenzene	<2	<0.32
1,1,1-Trichloroethane	<4.6	<0.85	1,2-Dichlorobenzene	<5.1	<0.85
Carbon tetrachloride	<2.7	<0.42	1,2,4-Trichlorobenzene	<6.3	<0.85
Benzene	<2.7	<0.85	Naphthalene	<2.2	<0.42
Cyclohexane	<59	<17	Hexachlorobutadiene	<4.5	<0.43

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ed1-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-20 1/5.5
Date Analyzed:	04/29/21	Data File:	042829.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<6.6	<3.8	1,2-Dichloropropane	<1.3	<0.28
Dichlorodifluoromethane	<2.7	<0.55	1,4-Dioxane	<2	<0.55
Chloromethane	<20	<9.9	2,2,4-Trimethylpentane	<26	<5.5
F-114	<3.8	<0.55	Methyl methacrylate	<23	<5.5
Vinyl chloride	<1.4	<0.55	Heptane	<23	<5.5
1,3-Butadiene	<0.24	<0.11	Bromodichloromethane	<0.37	<0.055
Butane	<26	<11	Trichloroethene	<0.59	<0.11
Bromomethane	<13	<3.3	cis-1,3-Dichloropropene	<2.5	<0.55
Chloroethane	<15	<5.5	4-Methyl-2-pentanone	<23	<5.5
Vinyl bromide	<2.4	<0.55	trans-1,3-Dichloropropene	<2.5	<0.55
Ethanol	74	40	Toluene	<100	<27
Acrolein	0.78	0.34	1,1,2-Trichloroethane	<0.3	<0.055
Pentane	<16	<5.5	2-Hexanone	<23	<5.5
Trichlorofluoromethane	<12	<2.2	Tetrachloroethene	<37	<5.5
Acetone	45	19	Dibromochloromethane	<0.47	<0.055
2-Propanol	81	33	1,2-Dibromoethane (EDB)	<0.42	<0.055
1,1-Dichloroethene	<2.2	<0.55	Chlorobenzene	<2.5	<0.55
trans-1,2-Dichloroethene	<2.2	<0.55	Ethylbenzene	<2.4	<0.55
Methylene chloride	210 lc	60 lc	1,1,2,2-Tetrachloroethane	<0.76	<0.11
t-Butyl alcohol (TBA)	<67	<22	Nonane	<29	<5.5
3-Chloropropene	<8.6	<2.7	Isopropylbenzene	<14	<2.7
CFC-113	<4.2	<0.55	2-Chlorotoluene	<28	<5.5
Carbon disulfide	<34	<11	Propylbenzene	<14	<2.7
Methyl t-butyl ether (MTBE)	<9.9	<2.7	4-Ethyltoluene	<14	<2.7
Vinyl acetate	<39	<11	m,p-Xylene	<4.8	<1.1
1,1-Dichloroethane	<2.2	<0.55	o-Xylene	<2.4	<0.55
cis-1,2-Dichloroethene	<2.2	<0.55	Styrene	<4.7	<1.1
Hexane	<19	<5.5	Bromoform	<11	<1.1
Chloroform	<0.27	<0.055	Benzyl chloride	<0.28	<0.055
Ethyl acetate	<40	<11	1,3,5-Trimethylbenzene	<14	<2.7
Tetrahydrofuran	6.7	2.3	1,2,4-Trimethylbenzene	<14	<2.7
2-Butanone (MEK)	<16	<5.5	1,3-Dichlorobenzene	<3.3	<0.55
1,2-Dichloroethane (EDC)	<0.22	<0.055	1,4-Dichlorobenzene	<1.3	<0.21
1,1,1-Trichloroethane	<3	<0.55	1,2-Dichlorobenzene	<3.3	<0.55
Carbon tetrachloride	<1.7	<0.28	1,2,4-Trichlorobenzene	<4.1	<0.55
Benzene	<1.8	<0.55	Naphthalene	<1.4	<0.28
Cyclohexane	<38	<11	Hexachlorobutadiene	<3	<0.28

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	WSU-Ed2-SG-042721	Client:	Aspect Consulting, LLC
Date Received:	04/27/21	Project:	McCollum Park 210222
Date Collected:	04/26/21	Lab ID:	104488-21 1/5.7
Date Analyzed:	04/29/21	Data File:	042830.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<6.9	<4	1,2-Dichloropropane	<1.3	<0.28
Dichlorodifluoromethane	<2.8	<0.57	1,4-Dioxane	<2.1	<0.57
Chloromethane	<21	<10	2,2,4-Trimethylpentane	<27	<5.7
F-114	<4	<0.57	Methyl methacrylate	<23	<5.7
Vinyl chloride	<1.5	<0.57	Heptane	<23	<5.7
1,3-Butadiene	<0.25	<0.11	Bromodichloromethane	<0.38	<0.057
Butane	<27	<11	Trichloroethene	<0.61	<0.11
Bromomethane	<13	<3.4	cis-1,3-Dichloropropene	<2.6	<0.57
Chloroethane	<15	<5.7	4-Methyl-2-pentanone	<23	<5.7
Vinyl bromide	<2.5	<0.57	trans-1,3-Dichloropropene	<2.6	<0.57
Ethanol	99	53	Toluene	<110	<28
Acrolein	<0.65	<0.28	1,1,2-Trichloroethane	<0.31	<0.057
Pentane	<17	<5.7	2-Hexanone	<23	<5.7
Trichlorofluoromethane	<13	<2.3	Tetrachloroethene	<39	<5.7
Acetone	140	58	Dibromochloromethane	<0.49	<0.057
2-Propanol	80	33	1,2-Dibromoethane (EDB)	<0.44	<0.057
1,1-Dichloroethene	<2.3	<0.57	Chlorobenzene	<2.6	<0.57
trans-1,2-Dichloroethene	<2.3	<0.57	Ethylbenzene	<2.5	<0.57
Methylene chloride	<200	<57	1,1,2,2-Tetrachloroethane	<0.78	<0.11
t-Butyl alcohol (TBA)	<69	<23	Nonane	<30	<5.7
3-Chloropropene	<8.9	<2.8	Isopropylbenzene	<14	<2.8
CFC-113	<4.4	<0.57	2-Chlorotoluene	<30	<5.7
Carbon disulfide	<36	<11	Propylbenzene	<14	<2.8
Methyl t-butyl ether (MTBE)	<10	<2.8	4-Ethyltoluene	<14	<2.8
Vinyl acetate	<40	<11	m,p-Xylene	<5	<1.1
1,1-Dichloroethane	<2.3	<0.57	o-Xylene	<2.5	<0.57
cis-1,2-Dichloroethene	<2.3	<0.57	Styrene	<4.9	<1.1
Hexane	<20	<5.7	Bromoform	<12	<1.1
Chloroform	<0.28	<0.057	Benzyl chloride	<0.3	<0.057
Ethyl acetate	<41	<11	1,3,5-Trimethylbenzene	<14	<2.8
Tetrahydrofuran	6.3	2.1	1,2,4-Trimethylbenzene	<14	<2.8
2-Butanone (MEK)	<17	<5.7	1,3-Dichlorobenzene	<3.4	<0.57
1,2-Dichloroethane (EDC)	<0.23	<0.057	1,4-Dichlorobenzene	<1.4	<0.22
1,1,1-Trichloroethane	<3.1	<0.57	1,2-Dichlorobenzene	<3.4	<0.57
Carbon tetrachloride	<1.8	<0.28	1,2,4-Trichlorobenzene	<4.2	<0.57
Benzene	<1.8	<0.57	Naphthalene	<1.5	<0.28
Cyclohexane	<39	<11	Hexachlorobutadiene	<3	<0.29

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	McCollum Park 210222
Date Collected:	Not Applicable	Lab ID:	01-849 MB
Date Analyzed:	04/28/21	Data File:	042816.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	<0.49	<0.1	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	<0.11	<0.05	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	<0.049	<0.01	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	<0.31	<0.05	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.26	<0.05
Cyclohexane	<6.9	<2	Hexachlorobutadiene	<0.53	<0.05

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	McCollum Park 210222
Date Collected:	Not Applicable	Lab ID:	01-858 MB
Date Analyzed:	04/30/21	Data File:	043011.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	ppbv	Compounds:	Concentration ug/m3	ppbv
Propene	<1.2	<0.7	1,2-Dichloropropane	<0.23	<0.05
Dichlorodifluoromethane	<0.49	<0.1	1,4-Dioxane	<0.36	<0.1
Chloromethane	<3.7	<1.8	2,2,4-Trimethylpentane	<4.7	<1
F-114	<0.7	<0.1	Methyl methacrylate	<4.1	<1
Vinyl chloride	<0.26	<0.1	Heptane	<4.1	<1
1,3-Butadiene	<0.044	<0.02	Bromodichloromethane	<0.067	<0.01
Butane	<4.8	<2	Trichloroethene	<0.11	<0.02
Bromomethane	<2.3	<0.6	cis-1,3-Dichloropropene	<0.45	<0.1
Chloroethane	<2.6	<1	4-Methyl-2-pentanone	<4.1	<1
Vinyl bromide	<0.44	<0.1	trans-1,3-Dichloropropene	<0.45	<0.1
Ethanol	<7.5	<4	Toluene	<19	<5
Acrolein	<0.11	<0.05	1,1,2-Trichloroethane	<0.055	<0.01
Pentane	<3	<1	2-Hexanone	<4.1	<1
Trichlorofluoromethane	<2.2	<0.4	Tetrachloroethene	<6.8	<1
Acetone	<4.8	<2	Dibromochloromethane	<0.085	<0.01
2-Propanol	<8.6	<3.5	1,2-Dibromoethane (EDB)	<0.077	<0.01
1,1-Dichloroethene	<0.4	<0.1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Methylene chloride	<35	<10	1,1,2,2-Tetrachloroethane	<0.14	<0.02
t-Butyl alcohol (TBA)	<12	<4	Nonane	<5.2	<1
3-Chloropropene	<1.6	<0.5	Isopropylbenzene	<2.5	<0.5
CFC-113	<0.77	<0.1	2-Chlorotoluene	<5.2	<1
Carbon disulfide	<6.2	<2	Propylbenzene	<2.5	<0.5
Methyl t-butyl ether (MTBE)	<1.8	<0.5	4-Ethyltoluene	<2.5	<0.5
Vinyl acetate	<7	<2	m,p-Xylene	<0.87	<0.2
1,1-Dichloroethane	<0.4	<0.1	o-Xylene	<0.43	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	Styrene	<0.85	<0.2
Hexane	<3.5	<1	Bromoform	<2.1	<0.2
Chloroform	<0.049	<0.01	Benzyl chloride	<0.052	<0.01
Ethyl acetate	<7.2	<2	1,3,5-Trimethylbenzene	<2.5	<0.5
Tetrahydrofuran	<0.29	<0.1	1,2,4-Trimethylbenzene	<2.5	<0.5
2-Butanone (MEK)	<2.9	<1	1,3-Dichlorobenzene	<0.6	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	1,4-Dichlorobenzene	<0.23	<0.038
1,1,1-Trichloroethane	<0.55	<0.1	1,2-Dichlorobenzene	<0.6	<0.1
Carbon tetrachloride	<0.31	<0.05	1,2,4-Trichlorobenzene	<0.74	<0.1
Benzene	<0.32	<0.1	Naphthalene	<0.058 j	<0.011 j
Cyclohexane	<6.9	<2	Hexachlorobutadiene	0.37	0.035

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488
Date Extracted: 04/05/21
Date Analyzed: 04/05/21

RESULTS FROM THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Results Reported as % Helium

Sample ID Laboratory ID	Helium
BMX-1-SG-042721 104488-15	<0.6
Pool-1-SG-042721 104488-16	<0.6
Pool-2-SG-042721 104488-17	<0.6
WSU-Ex1-SG-042721 104488-18	<0.6
WSU-Ex2-SG-042721 104488-19	<0.6
WSU-Ed1-SG-042721 104488-20	<0.6
WSU-Ed2-SG-042721 104488-21	<0.6
Method Blank 01-1055 MB	<0.6

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 104517-01 1/5.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	1,500	1,700	12
APH EC9-12 aliphatics	ug/m3	470	520	10
APH EC9-10 aromatics	ug/m3	<130	<130	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	103	70-130
APH EC9-12 aliphatics	ug/m3	67	123	70-130
APH EC9-10 aromatics	ug/m3	67	96	70-130

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD MA-APH

Laboratory Code: 104451-01 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	2,300	2,400	4
APH EC9-12 aliphatics	ug/m3	900	920	2
APH EC9-10 aromatics	ug/m3	<140	<140	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	99	70-130
APH EC9-12 aliphatics	ug/m3	67	121	70-130
APH EC9-10 aromatics	ug/m3	67	95	70-130

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104517-01 1/5.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Propene	ug/m3	130	100	26
Dichlorodifluoromethane	ug/m3	<2.6	2.9	nm
Chloromethane	ug/m3	<20	<20	nm
F-114	ug/m3	<3.7	<3.7	nm
Vinyl chloride	ug/m3	<1.4	<1.4	nm
1,3-Butadiene	ug/m3	24	24	0
Butane	ug/m3	47	41	14
Bromomethane	ug/m3	<12	<12	nm
Chloroethane	ug/m3	<14	<14	nm
Vinyl bromide	ug/m3	<2.3	<2.3	nm
Ethanol	ug/m3	71	85	18
Acrolein	ug/m3	<0.61	0.63	nm
Pentane	ug/m3	24	21	13
Trichlorofluoromethane	ug/m3	<12	<12	nm
Acetone	ug/m3	160	160	0
2-Propanol	ug/m3	<46	<46	nm
1,1-Dichloroethene	ug/m3	<2.1	<2.1	nm
trans-1,2-Dichloroethene	ug/m3	<2.1	<2.1	nm
Methylene chloride	ug/m3	<180	<180	nm
t-Butyl alcohol (TBA)	ug/m3	<64	<64	nm
3-Chloropropene	ug/m3	<8.3	8.9	nm
CFC-113	ug/m3	<4.1	<4.1	nm
Carbon disulfide	ug/m3	<33	<33	nm
Methyl t-butyl ether (MTBE)	ug/m3	<9.6	<9.6	nm
Vinyl acetate	ug/m3	<37	<37	nm
1,1-Dichloroethane	ug/m3	<2.1	<2.1	nm
cis-1,2-Dichloroethene	ug/m3	<2.1	<2.1	nm
Hexane	ug/m3	<19	<19	nm
Chloroform	ug/m3	0.70	0.60	15
Ethyl acetate	ug/m3	<38	<38	nm
Tetrahydrofuran	ug/m3	<1.6	<1.6	nm
2-Butanone (MEK)	ug/m3	32	33	3
1,2-Dichloroethane (EDC)	ug/m3	<0.21	<0.21	nm
1,1,1-Trichloroethane	ug/m3	<2.9	<2.9	nm
Carbon tetrachloride	ug/m3	<1.7	<1.7	nm
Benzene	ug/m3	54	52	4
Cyclohexane	ug/m3	<36	<36	nm
1,2-Dichloropropane	ug/m3	<1.2	<1.2	nm
1,4-Dioxane	ug/m3	<1.9	<1.9	nm
2,2,4-Trimethylpentane	ug/m3	<25	<25	nm

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104517-01 1/5.3 (Duplicate, continued)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Methyl methacrylate	ug/m3	<22	<22	nm
Heptane	ug/m3	<22	<22	nm
Bromodichloromethane	ug/m3	<0.36	<0.36	nm
Trichloroethene	ug/m3	<0.57	0.60	nm
cis-1,3-Dichloropropene	ug/m3	<2.4	<2.4	nm
4-Methyl-2-pentanone	ug/m3	<22	<22	nm
trans-1,3-Dichloropropene	ug/m3	<2.4	<2.4	nm
Toluene	ug/m3	<100	<100	nm
1,1,2-Trichloroethane	ug/m3	0.43	0.43	0
2-Hexanone	ug/m3	<22	<22	nm
Tetrachloroethene	ug/m3	<36	<36	nm
Dibromochloromethane	ug/m3	<0.45	<0.45	nm
1,2-Dibromoethane (EDB)	ug/m3	<0.41	<0.41	nm
Chlorobenzene	ug/m3	<2.4	<2.4	nm
Ethylbenzene	ug/m3	9.7	9.5	2
1,1,2,2-Tetrachloroethane	ug/m3	1.3	1.3	0
Nonane	ug/m3	<28	<28	nm
Isopropylbenzene	ug/m3	<13	<13	nm
2-Chlorotoluene	ug/m3	<27	<27	nm
Propylbenzene	ug/m3	<13	<13	nm
4-Ethyltoluene	ug/m3	<13	<13	nm
m,p-Xylene	ug/m3	16	16	0
o-Xylene	ug/m3	6.8	6.6	3
Styrene	ug/m3	4.9	4.6	6
Bromoform	ug/m3	<11	<11	nm
Benzyl chloride	ug/m3	<0.27	<0.27	nm
1,3,5-Trimethylbenzene	ug/m3	<13	<13	nm
1,2,4-Trimethylbenzene	ug/m3	<13	<13	nm
1,3-Dichlorobenzene	ug/m3	<3.2	<3.2	nm
1,4-Dichlorobenzene	ug/m3	<1.2	<1.2	nm
1,2-Dichlorobenzene	ug/m3	<3.2	<3.2	nm
1,2,4-Trichlorobenzene	ug/m3	<3.9	<3.9	nm
Naphthalene	ug/m3	<1.4	<1.4	nm
Hexachlorobutadiene	ug/m3	1.6	1.5	6

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Propene	ug/m3	23	114	70-130
Dichlorodifluoromethane	ug/m3	67	117	70-130
Chloromethane	ug/m3	28	116	70-130
F-114	ug/m3	94	117	70-130
Vinyl chloride	ug/m3	35	105	70-130
1,3-Butadiene	ug/m3	30	87	70-130
Butane	ug/m3	32	96	70-130
Bromomethane	ug/m3	52	112	70-130
Chloroethane	ug/m3	36	119	70-130
Vinyl bromide	ug/m3	59	102	70-130
Ethanol	ug/m3	25	133 vo	70-130
Acrolein	ug/m3	31	99	70-130
Pentane	ug/m3	40	89	70-130
Trichlorofluoromethane	ug/m3	76	109	70-130
Acetone	ug/m3	32	100	70-130
2-Propanol	ug/m3	33	100	70-130
1,1-Dichloroethene	ug/m3	54	97	70-130
trans-1,2-Dichloroethene	ug/m3	54	93	70-130
Methylene chloride	ug/m3	94	102	70-130
t-Butyl alcohol (TBA)	ug/m3	41	98	70-130
3-Chloropropene	ug/m3	42	92	70-130
CFC-113	ug/m3	100	102	70-130
Carbon disulfide	ug/m3	42	113	70-130
Methyl t-butyl ether (MTBE)	ug/m3	49	89	70-130
Vinyl acetate	ug/m3	48	88	70-130
1,1-Dichloroethane	ug/m3	55	107	70-130
cis-1,2-Dichloroethene	ug/m3	54	91	70-130
Hexane	ug/m3	48	82	70-130
Chloroform	ug/m3	66	107	70-130
Ethyl acetate	ug/m3	49	100	70-130
Tetrahydrofuran	ug/m3	40	93	70-130
2-Butanone (MEK)	ug/m3	40	88	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	110	70-130
1,1,1-Trichloroethane	ug/m3	74	109	70-130
Carbon tetrachloride	ug/m3	85	108	70-130
Benzene	ug/m3	43	93	70-130
Cyclohexane	ug/m3	46	79	70-130
1,2-Dichloropropane	ug/m3	62	116	70-130
1,4-Dioxane	ug/m3	49	97	70-130
2,2,4-Trimethylpentane	ug/m3	63	100	70-130

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample (Continued)

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Methyl methacrylate	ug/m3	55	111	70-130
Heptane	ug/m3	55	105	70-130
Bromodichloromethane	ug/m3	90	122	70-130
Trichloroethene	ug/m3	73	112	70-130
cis-1,3-Dichloropropene	ug/m3	61	109	70-130
4-Methyl-2-pentanone	ug/m3	55	80	70-130
trans-1,3-Dichloropropene	ug/m3	61	110	70-130
Toluene	ug/m3	51	98	70-130
1,1,2-Trichloroethane	ug/m3	74	123	70-130
2-Hexanone	ug/m3	55	110	70-130
Tetrachloroethene	ug/m3	92	113	70-130
Dibromochloromethane	ug/m3	120	116	70-130
1,2-Dibromoethane (EDB)	ug/m3	100	107	70-130
Chlorobenzene	ug/m3	62	105	70-130
Ethylbenzene	ug/m3	59	90	70-130
1,1,2,2-Tetrachloroethane	ug/m3	93	112	70-130
Nonane	ug/m3	71	104	70-130
Isopropylbenzene	ug/m3	66	101	70-130
2-Chlorotoluene	ug/m3	70	98	70-130
Propylbenzene	ug/m3	66	100	70-130
4-Ethyltoluene	ug/m3	66	97	70-130
m,p-Xylene	ug/m3	120	92	70-130
o-Xylene	ug/m3	59	94	70-130
Styrene	ug/m3	58	94	70-130
Bromoform	ug/m3	140	107	70-130
Benzyl chloride	ug/m3	70	116	70-130
1,3,5-Trimethylbenzene	ug/m3	66	95	70-130
1,2,4-Trimethylbenzene	ug/m3	66	91	70-130
1,3-Dichlorobenzene	ug/m3	81	111	70-130
1,4-Dichlorobenzene	ug/m3	81	99	70-130
1,2-Dichlorobenzene	ug/m3	81	104	70-130
1,2,4-Trichlorobenzene	ug/m3	100	97	70-130
Naphthalene	ug/m3	71	92	70-130
Hexachlorobutadiene	ug/m3	140	101	70-130

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104451-01 1/5.5 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Propene	ug/m3	<6.6	<6.6	nm
Dichlorodifluoromethane	ug/m3	<2.7	3.3	nm
Chloromethane	ug/m3	<20	<20	nm
F-114	ug/m3	<3.8	<3.8	nm
Vinyl chloride	ug/m3	<1.4	<1.4	nm
1,3-Butadiene	ug/m3	<0.24	<0.24	nm
Butane	ug/m3	<26	<26	nm
Bromomethane	ug/m3	<13	<13	nm
Chloroethane	ug/m3	<15	<15	nm
Vinyl bromide	ug/m3	<2.4	<2.4	nm
Ethanol	ug/m3	95	87	9
Acrolein	ug/m3	<0.63	<0.63	nm
Pentane	ug/m3	<16	<16	nm
Trichlorofluoromethane	ug/m3	<12	<12	nm
Acetone	ug/m3	430	440	2
2-Propanol	ug/m3	200	200	0
1,1-Dichloroethene	ug/m3	<2.2	<2.2	nm
trans-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Methylene chloride	ug/m3	<190	<190	nm
t-Butyl alcohol (TBA)	ug/m3	<67	<67	nm
3-Chloropropene	ug/m3	<8.6	<8.6	nm
CFC-113	ug/m3	<4.2	<4.2	nm
Carbon disulfide	ug/m3	<34	<34	nm
Methyl t-butyl ether (MTBE)	ug/m3	<9.9	<9.9	nm
Vinyl acetate	ug/m3	<39	<39	nm
1,1-Dichloroethane	ug/m3	<2.2	<2.2	nm
cis-1,2-Dichloroethene	ug/m3	<2.2	<2.2	nm
Hexane	ug/m3	<19	<19	nm
Chloroform	ug/m3	<0.27	<0.27	nm
Ethyl acetate	ug/m3	<40	<40	nm
Tetrahydrofuran	ug/m3	<1.6	<1.6	nm
2-Butanone (MEK)	ug/m3	<16	<16	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.22	<0.22	nm
1,1,1-Trichloroethane	ug/m3	53	52	2
Carbon tetrachloride	ug/m3	<1.7	<1.7	nm
Benzene	ug/m3	<1.8	<1.8	nm
Cyclohexane	ug/m3	<38	<38	nm
1,2-Dichloropropane	ug/m3	<1.3	<1.3	nm
1,4-Dioxane	ug/m3	<2	<2	nm
2,2,4-Trimethylpentane	ug/m3	<26	<26	nm

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 104451-01 1/5.5 (Duplicate, continued)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Methyl methacrylate	ug/m3	<23	<23	nm
Heptane	ug/m3	<23	<23	nm
Bromodichloromethane	ug/m3	<0.37	<0.37	nm
Trichloroethene	ug/m3	<0.59	<0.59	nm
cis-1,3-Dichloropropene	ug/m3	<2.5	<2.5	nm
4-Methyl-2-pentanone	ug/m3	170	170	0
trans-1,3-Dichloropropene	ug/m3	<2.5	<2.5	nm
Toluene	ug/m3	<100	<100	nm
1,1,2-Trichloroethane	ug/m3	<0.3	<0.3	nm
2-Hexanone	ug/m3	<23	<23	nm
Tetrachloroethene	ug/m3	<37	<37	nm
Dibromochloromethane	ug/m3	<0.47	<0.47	nm
1,2-Dibromoethane (EDB)	ug/m3	<0.42	<0.42	nm
Chlorobenzene	ug/m3	<2.5	<2.5	nm
Ethylbenzene	ug/m3	<2.4	<2.4	nm
1,1,2,2-Tetrachloroethane	ug/m3	<0.76	<0.76	nm
Nonane	ug/m3	<29	<29	nm
Isopropylbenzene	ug/m3	<14	<14	nm
2-Chlorotoluene	ug/m3	<28	<28	nm
Propylbenzene	ug/m3	<14	<14	nm
4-Ethyltoluene	ug/m3	<14	<14	nm
m,p-Xylene	ug/m3	6.7	6.6	2
o-Xylene	ug/m3	2.9	2.9	0
Styrene	ug/m3	<4.7	<4.7	nm
Bromoform	ug/m3	<11	<11	nm
Benzyl chloride	ug/m3	<0.28	<0.28	nm
1,3,5-Trimethylbenzene	ug/m3	<14	<14	nm
1,2,4-Trimethylbenzene	ug/m3	<14	<14	nm
1,3-Dichlorobenzene	ug/m3	<3.3	<3.3	nm
1,4-Dichlorobenzene	ug/m3	<1.3	<1.3	nm
1,2-Dichlorobenzene	ug/m3	<3.3	<3.3	nm
1,2,4-Trichlorobenzene	ug/m3	<4.1	<4.1	nm
Naphthalene	ug/m3	<1.4	<1.4	nm
Hexachlorobutadiene	ug/m3	<3	<3	nm

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Propene	ug/m3	23	118	70-130
Dichlorodifluoromethane	ug/m3	67	120	70-130
Chloromethane	ug/m3	28	110	70-130
F-114	ug/m3	94	110	70-130
Vinyl chloride	ug/m3	35	106	70-130
1,3-Butadiene	ug/m3	30	94	70-130
Butane	ug/m3	32	99	70-130
Bromomethane	ug/m3	52	140 vo	70-130
Chloroethane	ug/m3	36	110	70-130
Vinyl bromide	ug/m3	59	108	70-130
Ethanol	ug/m3	25	116	70-130
Acrolein	ug/m3	31	105	70-130
Pentane	ug/m3	40	95	70-130
Trichlorofluoromethane	ug/m3	76	118	70-130
Acetone	ug/m3	32	109	70-130
2-Propanol	ug/m3	33	97	70-130
1,1-Dichloroethene	ug/m3	54	102	70-130
trans-1,2-Dichloroethene	ug/m3	54	98	70-130
Methylene chloride	ug/m3	94	99	70-130
t-Butyl alcohol (TBA)	ug/m3	41	104	70-130
3-Chloropropene	ug/m3	42	105	70-130
CFC-113	ug/m3	100	107	70-130
Carbon disulfide	ug/m3	42	106	70-130
Methyl t-butyl ether (MTBE)	ug/m3	49	95	70-130
Vinyl acetate	ug/m3	48	105	70-130
1,1-Dichloroethane	ug/m3	55	112	70-130
cis-1,2-Dichloroethene	ug/m3	54	97	70-130
Hexane	ug/m3	48	85	70-130
Chloroform	ug/m3	66	112	70-130
Ethyl acetate	ug/m3	49	108	70-130
Tetrahydrofuran	ug/m3	40	94	70-130
2-Butanone (MEK)	ug/m3	40	96	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	115	70-130
1,1,1-Trichloroethane	ug/m3	74	114	70-130
Carbon tetrachloride	ug/m3	85	113	70-130
Benzene	ug/m3	43	98	70-130
Cyclohexane	ug/m3	46	80	70-130
1,2-Dichloropropane	ug/m3	62	118	70-130
1,4-Dioxane	ug/m3	49	94	70-130
2,2,4-Trimethylpentane	ug/m3	63	104	70-130

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: Laboratory Control Sample (Continued)

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Methyl methacrylate	ug/m3	55	113	70-130
Heptane	ug/m3	55	110	70-130
Bromodichloromethane	ug/m3	90	126	70-130
Trichloroethene	ug/m3	73	114	70-130
cis-1,3-Dichloropropene	ug/m3	61	106	70-130
4-Methyl-2-pentanone	ug/m3	55	96	70-130
trans-1,3-Dichloropropene	ug/m3	61	113	70-130
Toluene	ug/m3	51	102	70-130
1,1,2-Trichloroethane	ug/m3	74	124	70-130
2-Hexanone	ug/m3	55	115	70-130
Tetrachloroethene	ug/m3	92	113	70-130
Dibromochloromethane	ug/m3	120	122	70-130
1,2-Dibromoethane (EDB)	ug/m3	100	108	70-130
Chlorobenzene	ug/m3	62	113	70-130
Ethylbenzene	ug/m3	59	94	70-130
1,1,2,2-Tetrachloroethane	ug/m3	93	115	70-130
Nonane	ug/m3	71	102	70-130
Isopropylbenzene	ug/m3	66	102	70-130
2-Chlorotoluene	ug/m3	70	108	70-130
Propylbenzene	ug/m3	66	104	70-130
4-Ethyltoluene	ug/m3	66	93	70-130
m,p-Xylene	ug/m3	120	96	70-130
o-Xylene	ug/m3	59	97	70-130
Styrene	ug/m3	58	98	70-130
Bromoform	ug/m3	140	117	70-130
Benzyl chloride	ug/m3	70	120	70-130
1,3,5-Trimethylbenzene	ug/m3	66	101	70-130
1,2,4-Trimethylbenzene	ug/m3	66	94	70-130
1,3-Dichlorobenzene	ug/m3	81	109	70-130
1,4-Dichlorobenzene	ug/m3	81	107	70-130
1,2-Dichlorobenzene	ug/m3	81	108	70-130
1,2,4-Trichlorobenzene	ug/m3	100	99	70-130
Naphthalene	ug/m3	71	100	70-130
Hexachlorobutadiene	ug/m3	140	104	70-130

Date of Report: 05/11/21
Date Received: 04/27/21
Project: McCollum Park 210222, F&BI 104488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Laboratory Code: 104451-01 (Duplicate)

Analyte	Sample Result (%)	Duplicate Result (%)	Relative Percent Difference	Acceptance Criteria
Helium	<0.6	<0.6	nm	0-20

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

104488

SAMPLE CHAIN OF CUSTODY ME 04/27/21

Page # 1 of 3

Report To Della Massey, Peter Bannister
Company Aspect Consulting
Address 710 2nd Ave, Ste. 550
City, State, ZIP Seattle, WA 98104
Phone 860.368.9745 Email dmassey@aspectconsulting.com

SAMPLERS (signature) B CCM

PROJECT NAME & ADDRESS: McCollum Park
PO #: 210222

NOTES: Full Scan on all per DM 4/27/21
Cancel He on IA/OA samples per DM ME

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	Full Scan TO15-CVOCs	APH	Helium		Notes
Pool-AA-042621	01	18565	06606	IA / SG	4/26/21	28.5	0734	8	1534			X	X	X		Outdoor Air
Pool-1-IA-042621	02	37212	07870	(IA) / SG		30	0738	7	1537							
Pool-2-IA-042621	03	23230	05352	(IA) / SG		29	0745	6	1541							
Stream-1-IA-042621	04	32100	06608	(IA) SG		29	0805	7.5	1553							
Stream-2-IA-042621	05	35331	06607	(IA) / SG		30	0811	5	1555							
Stream-3-IA-042621	06	20554	07849	(IA) / SG		28	0815	8	1557							
Stream-AA-042621	07	18579	06605	IA / SG		30	0825	9	1600							Outdoor Air
WSU-AA-042621	08	18566	08181	(IA) / SG		31	0830	7	1605							

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: B CCM	Baxter Call	Aspect	4/27/21	1415
Received by:	Nhan Phan	FCBI	4/27/21	1415
Relinquished by:				
Received by:		Samples received at 20 °C		

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

104488

SAMPLE CHAIN OF CUSTODY

ME 04/27/21

Page # 2 of 3

Report To Della Massey, Peter Banister ~~Banisters~~

Company Aspect

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) B Call	
PROJECT NAME & ADDRESS McCollum Park	PO # 210222
NOTES:	INVOICE TO

TURNAROUND TIME
- [X] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 ~~VOCs~~ Full Scan	APH	Helium		Notes
WSU-Ex1-IA-042621	09	20552	05353	(IA) / SG	4/26/21	30	0837	9	1608			X	X	X		
WSU-Ex2-IA-042621	10	20594	06609	(IA) / SG		29	0840	8.5	1610							
WSU-Ed1-IA-042621	11	18573	00183	(IA) / SG		31	0845	9	1621							
WSU-Ed2-IA-042621	12	18572	05350	(IA) / SG		29	0850	9	1618							
BMX-1-IA-042621	13	20542	07853	(IA) / SG		29	0857	7.5	1629							
BMX-AA-042621	14	18580	05349	IA / SG		29	0900	8	1632							Outdoor Air
BMX-1-SG-042621	15	3312	305	IA / (SG)	4/27/21	30	0615	5	0620							
Pool-1-SG-042721	16	3669	302	IA / (SG)		~~29~~ 5	~~0710~~ 0810	5	0814							

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: B Call	Baxter Call	Aspect	4/27/21	1415
Received by:	Nhan Phan	FEBI	4/27/21	1415
Relinquished by:				
Received by:		Samples received at 2 °C		

104488

SAMPLE CHAIN OF CUSTODY

ME 04/27/21

Page # 3 of 3

Report To Delia Massey, Peter Banister

Company Aspect

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) B Cell

PROJECT NAME & ADDRESS: McCollum Park

PO #: 210222

NOTES:

INVOICE TO

TURNAROUND TIME
☒ Standard
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Default: Clean after 3 days
☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	Full Scan TO15 eVOCs	APH	Helium		Notes
Pool-2-SG-042721	17	3540	244	IA / (SG)	4/27/21	30	0741	5	0746			X	X	X		
WSU-Ex1-SG-042721	18	3445	301	IA / (SG)	↓	29	0837	5	0842			↓	↓	↓		
WSU-Ex2-SG-042721	19	3230	243	IA / (SG)		29	0925	5	0930							
WSU-Ed1-SG-042721	20	2439	259	IA / (SG)		30	1020	5	1025							
WSU-Ed2-SG-042721	21	2434	304	IA / (SG)		29	1056	5	1101							
				IA / SG												
				IA / SG												
				IA / SG												

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COCTO-15.DOC

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: B Cell	Baxter Cell	Aspect	4/27/21	1415
Received by:	Nhan Phan	FEBI	4/29/21	1415
Relinquished by:				
Received by:		Samples received at 20 °C		

This Page Intentionally Left Blank

APPENDIX E

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.

Exclusion of Mold, Fungus, Radon, Lead, and HBM

Aspect's services do not include the investigation, detection, prevention or assessment of the presence of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detection, assessment, prevention or abatement of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Aspect's services also do not include the investigation or assessment of hazardous building materials (HBM) such as asbestos, polychlorinated biphenyls (PCBs) in light ballasts, lead based paint, asbestos-containing building materials, urea-formaldehyde insulation in on-site structures or debris or any other HBMs. Aspect's services do not include an evaluation of radon or lead in drinking water, unless specifically requested.

This Page Intentionally Left Blank