

PACIFIC groundwater GROUP

**BIRDS EYE FOODS TACOMA, WA
VAPOR INTRUSION STUDY
VCP SITE NUMBER SW1187**

October 17, 2012

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VAPOR INTRUSION STUDY
VCP SITE NUMBER SW1187**

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October 17, 2012

J11001.04

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1.0 INTRODUCTION

This report summarizes a Vapor Intrusion (VI) investigation performed at the Birds Eye Foods facility in Tacoma, Washington (Figure 1). The VI investigation was performed in response to comments made by the Washington State Department of Ecology (Ecology) regarding findings of the 2011 Remedial Investigation and Feasibility Study (2011 RI/FS; Pacific Groundwater Group, 2011), performed on behalf of Birds Eye Foods LLC (Birds Eye). The subject of the 2011 RI/FS is a portion of the Birds Eye facility, referred to as the “Former Boiler Room UST Site” or “Boiler Room Site” (Figure 2). The Birds Eye Boiler Room Site entered Ecology’s Voluntary Cleanup Program (VCP) in September 2011 and was assigned VCP Site Number SW1187.

The objective of the VI investigation was to assess if volatile compounds present in petroleum-contaminated soil at the Boiler Room Site (Site) are of significant strength to pose a potential vapor intrusion threat to indoor air in current or future buildings at the Site.

The VI investigation and this summary report were developed using generally accepted hydrogeologic practices used at this time and in this vicinity, for exclusive application to this study, and for the exclusive use of Bird’s Eye Foods. This is in lieu of other warranties, express or implied.

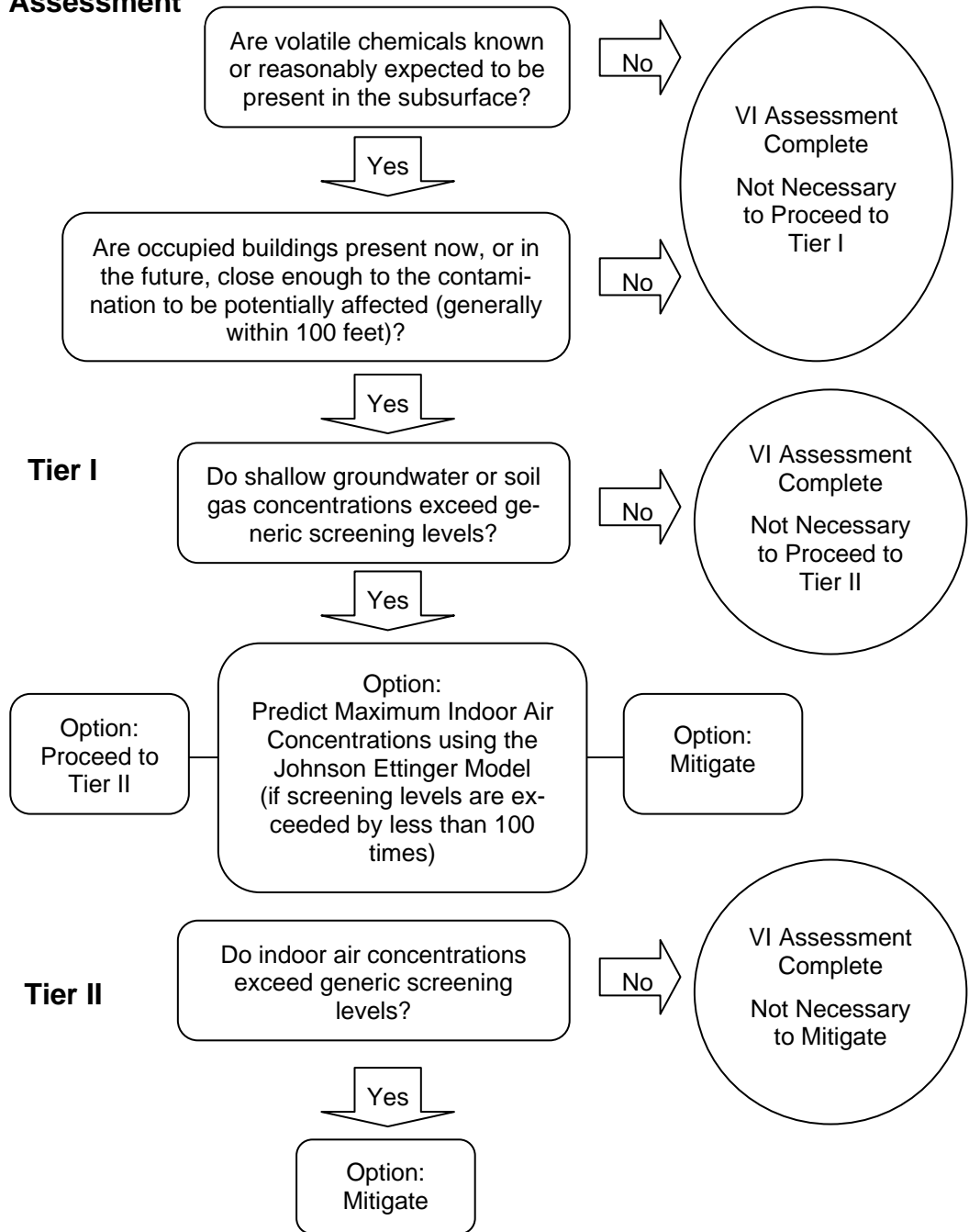
1.1 OVERVIEW OF THE ECOLOGY GUIDANCE APPROACH TO VI ASSESSMENT

Ecology’s *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Draft Vapor Guidance; Ecology, 2009) describes a tiered approach to evaluate if concentrations of volatile substances are high enough to pose a potentially unacceptable threat to indoor air quality in current or future buildings. Each succeeding step in the tiered process presents the opportunity to conclude that subsurface contamination does not pose an unacceptable threat to indoor air quality, and therefore to complete the vapor intrusion assessment. The following schematic is intended to provide a general overview of the VI assessment approach and to provide a framework for the Birds Eye VI investigation. The Draft Vapor Guidance includes finer details that are not captured in the schematic.

The Birds Eye VI investigation was performed because the Boiler Room Site advanced through the Preliminary Assessment to a Tier I Assessment. Benzene was detected in Birds Eye soil samples collected during the 2011 investigations. Benzene is identified in the Draft Vapor Guidance as a substance that can potentially contaminate soil gas to unacceptable levels. There are currently (unoccupied) buildings within 100 lateral feet of the soil contamination at the Boiler Room Site, and future redevelopment could involve construction or additional or replacement buildings.

Tiered Approach to VI Assessments

Preliminary Assessment



2.0 SUMMARY OF FIELD INVESTIGATION AND SAMPLE COLLECTION

Following the Draft Vapor Guidance and based on observations of non-aqueous phase liquid (NAPL) at the Boiler Room Site, soil gas samples were identified as the recommended media to evaluate potential vapor intrusion.

This section summarizes field work associated with collection of the soil gas samples. Section 3 summarizes the analytical results relative to Ecology screening levels.

2.1 COMPLIANCE WITH WORK PLAN

A Vapor Intrusion Work Plan (Pacific Groundwater Group, 2012) was prepared in compliance with the Draft Vapor Guidance and developed under the Washington State Model Toxics Control Act (MTCA, Washington Administrative Code [WAC] Chapter 173-340). The Work Plan proposed sampling locations and rationale, and provided specific guidance on sample collection and handling, analytical parameters, and soil gas screening levels. In addition, the Work Plan includes descriptions of Site hydrogeologic units in the vadose zone and groundwater conditions, and identifies Site contaminants-of-concern. The Work Plan was reviewed by Ecology and is presented in Appendix A.

The Boiler Room Site VI investigation was performed in accordance with the Work Plan with the following exceptions:

- As requested by Ecology, samples were collected in a helium shroud to check for leaks to the sampling train.
- As requested by Ecology, one duplicate soil gas sample was collected.
- The pilot borehole associated with SG-20 was not advanced to the water table as described in the Work Plan because NAPL was observed in the vadose zone; therefore, the depth to NAPL was used as the basis of the target soil gas sampling depth and not the depth to water.
- During drilling for the pilot boreholes, soil cores were retrieved continuously instead of at 4 or 5 foot intervals as described in the Work Plan.
- The Post Run Tubing (PRT) system attachment was confirmed by pulling up on the tubing and feeling resistance instead of applying a vacuum.

2.2 SAMPLE LOCATIONS

The locations of the soil gas samples are presented in Figure 3. These locations are generally consistent with the Work Plan with minor adjustments to avoid utilities. As described in the Work Plan, soil gas sample locations were based on the results of the 2011 soil investigations. Specifically, soil gas samples were collected in areas where the highest concentrations of benzene were measured in 2011 Site soil samples. During the 2011 soil investigations, benzene was detected at:

- B11-06: samples collected from 25 and 30 feet below ground
- B11-08: samples collected from 20, 25, and 30 feet below ground
- B11-14: sample collected from 30 feet below ground

The locations of these soil samples are also presented in Figure 3.

2011 soil samples with benzene detections were collected below the water table. Soil gas samples can be compromised by moisture, so it is important to avoid moist or saturated soils. Therefore, the target depths for collecting soil gas samples were either just above the contaminant source or above the capillary zone, whichever was shallower. Pilot boreholes and depth to water measurements in nearby Site monitoring wells were used to identify soil gas sampling depths.

2.3 DRILLING

A direct-push rig was used to drill boreholes for the VI investigation. A Washington-State licensed driller with ESN Northwest of Olympia, Washington provided drilling services. Pilot boreholes were drilled to identify the target soil gas sampling interval based on depths to soil contamination or the capillary zone. Soil gas samples were not collected from the pilot boreholes. Instead secondary boreholes were advanced approximately 2 to 3 feet from the pilot boreholes.

Soil cuttings were drummed and transported offsite for treatment and disposal at a licensed facility. All boreholes drilled for the VI investigation were backfilled with bentonite in accordance with appropriate state decommissioning standards and patched with asphalt.

Pilot Boreholes

Pilot boreholes were drilled near B11-14 and B11-06 on June 26, 2012 to identify the target depths for soil gas samples in these areas. Continuous soil cores were driven into undisturbed material in advance of the boreholes. The cores were retrieved, visually inspected, and logged in the field by a PGG hydrogeologist. Significant subsurface characterization has been performed at the Boiler Room Site and soil samples were not collected for lab analysis. Geologic logs for the pilot boreholes are presented in Figures 4 and 5.

Pilot borehole VI-PH-1 near B11-14 was advanced to the capillary zone, encountered at approximately 15.5 feet below ground; field screening (visual and odor inspection) did not indicate the presence of soil contamination above the capillary zone. Pilot borehole VI-PH-2 near B11-06 was advanced to 16 feet below ground and did not encounter the capillary zone; however, NAPL was encountered at 10 feet below ground.

Pilot boreholes were not drilled near the two other soil gas sampling locations because sufficient information on depths to soil contamination in these areas were available from previous investigations and the depth to the capillary zone could be estimated based on water level measurements in nearby PW-4 (Figure 3).

Soil Gas Sample Collection Boreholes

Boreholes for collection of soil gas samples SG-10, SG-20, SG-30, SG-40 (Figure 3), and duplicate sample SG-22 were drilled on July 3, 2012. These boreholes were advanced to the following target sampling depths without retrieval of soil cores for visual inspection:

- SG-10: 15 to 15.5 feet based on the estimated depth to the capillary zone in VI-PH-1
- SG-20 and duplicate SG-22: 8.5 to 9 feet based on observations of NAPL at 10 feet in soil cores retrieved from pilot borehole VI-PH-2.
- SG-30 and SG-40: 12 to 12.5 feet based on observations of NAPL at 14 feet in B11-09 and 16.25 feet in B11-08, and measured depth to water of 18 feet in nearby well PW-4.

2.4 SOIL GAS SAMPLING

Soil gas samples were collected using the Post-Run Tubing (PRT) system; disposable tubing, Summa canisters, and sampling manifolds. The PRT system is designed to minimize leakage of ambient air from inside of the drilling rods to the sample tubing. Prior to mobilizing to the field, the initial vacuum of each Summa canister was verified and recorded in inches of mercury (inHg).

After each sampling borehole had been advanced to the target depth, disposable, Teflon tubing with a PRT adapter was lowered to the bottom of the borehole and threaded onto a point holder. An O-ring was used between the PRT adapter and point holder to minimize leakage at the fitting. The drilling rods, tubing, and point holder were then pulled back (retracted) approximately a ½ foot to expose the sampling interval. A surface seal of hydrated bentonite was placed around the outside of the drill rods to inhibit surface air migration down the outside of the rods and plastic sheeting was spread on the ground surrounding the borehole.

The purge volume at each sampling location was calculated by three times the volume of the sample tubing. The purge volume was then converted to inches of mercury based on guidance from the analytical lab that, for a 6-litre Summa canister, 5-inHg represents 1-litre of gas filled.

A dedicated sampling manifold was assembled for each soil gas sample. The manifolds included a 167 mL/minute flow regulator, particulate filter, pressure gages, and a manifold valve. A 6-litre purge Summa canister and 1-litre sample Summa canister were attached to each sampling manifold. At SG-20, a T-was added to the manifold so that a second 1-litre Summa canister could be attached for collection of a duplicate sample (SG-22).

Prior to sampling, a leak-check of the manifold and canister sampling train was performed by capping the inlet of the manifold, opening the manifold valve, and opening the purge canister valve. A constant vacuum reading on the pressure gage indicated the manifold and canister assembly was airtight. A drop in the vacuum reading indicated a leak and the fittings were adjusted until the vacuum held.

Once the leak-check was completed, the sample tubing was attached to the inlet of the manifold. A minimum of 20 minutes was allowed to pass between the time each surface seal was placed around the borehole and purging of the sample tubing. Valves to the purge canister were then opened until the pressure gage indicated the calculated purge volume had been achieved. Valves to the sample canister were then opened to commence collection of the soil gas sample. A helium shroud consisting of an inverted plastic storage box was placed over the borehole and manifold and canister assembly. Weights were placed on the top of the storage box to compress foam on the underside and minimize leakage of ambient air into the shroud. Ultra-high grade helium was allowed to flow into the shroud and a portable gas meter inside the shroud was used to monitor helium levels.

Soil gas samples were collected until the vacuum reading on the sample Summa canister was approximately -5 inches of mercury. Ending pressures were recorded on the canister tag, field notes, and chain-of custody.

Soil gas samples were shipped to AirToxics, a Washington-state certified lab in Folsom, California, following standard chain-of-custody procedures. Consistent with the Work Plan, samples were analyzed for:

- Benzene, toluene, ethylbenzene, xylenes (BTEX) by method TO-15
- Percent oxygen by method ASTM D-1946

The samples were also analyzed for percent helium by ASTM D-1946 to assess leakage in the sampling train.

3.0 ANALYTICAL RESULTS

Analytical results are summarized in Table 1. Helium was not detected in the soil gas samples, indicating leakage of ambient air was not significant.

MTCA Industrial air cleanup levels would be appropriate for current and future buildings at the Boiler Room Site based on current land use and the expectation that future land use will remain industrial. Industrial indoor air cleanup levels are established under MTCA Method C and soil gas screening levels protective of indoor air are tabulated in the Draft Vapor Guidance. Soil gas screening levels are depth dependent and are established for just below a building and at 15 foot depth or greater. Screening levels represent the soil gas concentrations that are expected to not result in an exceedance of the air cleanup level in an overlying structure under most circumstances (Ecology, 2009).

3.1 COMPARISON TO SCREENING LEVELS

BTEX compounds were detected in samples SG-10, SG-20 (and duplicate sample SG-22), and SG-30. The concentrations of the BTEX compounds in the Boiler Room soil gas samples did not exceed MTCA Method C screening levels (Table 1). These results indicate that volatile compounds present in petroleum-contaminated soil at the Boiler Room Site are below concentrations that could lead to unacceptable indoor air quality in current or future buildings at the Site, per the Draft Vapor Guidance.

In accordance with Ecology's Draft Vapor Guidance:

If measured [soil gas] concentrations are below levels that could lead to unacceptable indoor air concentrations, it is reasonable to conclude during Tier I that no further VI assessment is needed (Ecology, 2009).

Therefore, because concentrations in the Birds Eye soil gas samples do not exceed generic industrial screening levels, it is not necessary to proceed further with the VI assessment either to estimate indoor air concentrations using the Johnson and Ettinger Model or to advance to a Tier II Assessment.

The percent oxygen in the soil gas samples collected in the upper 12.5 feet of soil ranged from 13 to 20-percent (Table 1). According to the Draft Vapor Guidance, oxygen percentages greater than 4-percent indicate that subsurface conditions are favorable to aerobic degradation.

3.2 QUALITY ASSURANCE/QUALITY CONTROL

Air Toxics reported that the analytical data and associated quality control (QC) are compliant with the laboratory criteria. The differences in vacuum readings between the field at the end of sample collection and receipt at the lab were less than 5 inches of mercury which Air Toxics do not consider significant due to the rough nature of the field gages.

A duplicate soil sample, SG-22, was collected from the borehole where sample SG-20 was collected. Ecology's Draft Vapor Guidance does not specify acceptable relevant percent differences (RPDs) for soil gas field duplicates. The California Environmental Protection Agency, Department of Toxic Substances Control Active Soil Gas Investigations Advisory states that:

When comparing the results from field duplicate/replicate samples, a wider allowance should be given for the differences (e.g., 50 percent Relative Percent Difference [RPD]) because of the inherent variability associated with soil gas samples.

The RPDs between SG-20 and SG-22 were less than 50-percent or within plus/minus of the lab reporting limit for benzene, ethylbenzene, and o-xylene. The RPD for m,p-xylene was slightly elevated at 59-percent and the RPD for toluene was 98-percent. A replicate soil gas sample collected immediately after the original sample may not be the same due to spatial and temporal differences. The lab quality control was in control for all analyzed compounds and the Boiler Room Site soil gas sample concentrations for m,p-Xylene and toluene are two to three orders of magnitude below the MTCA Method C soil gas screening levels for samples collected at depths less than 15 feet. Therefore, the data meet project objectives and are not qualified or rejected.

4.0 CONCLUSION

The concentrations of volatile chemicals-of-concern in soil gas samples collected at the Boiler Room Site do not exceed industrial screening levels. Soil gas sampling locations were biased to the greatest known concentrations of benzene in Site soil and depths shall-

lower than the contamination or the capillary zone. Therefore, in compliance with the Draft Vapor Guidance, volatile compounds associated with petroleum contamination in soil at the Boiler Room Site are not expected to result in exceedances of indoor air clean-up levels in a current, or future, overlying building under most circumstances.

5.0 REFERENCES

California Environmental Protection Agency, Department of Toxic Substance Control (DTSC), April 2012. Advisory Active Soil Gas Investigations.

Pacific Groundwater Group. December 16, 2011. Birds Eye Foods Tacoma, WA 2011 Remedial Investigation/Feasibility Study.

Washington State Department of Ecology. October 2009. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Review Draft. Publication No. 09-09-047

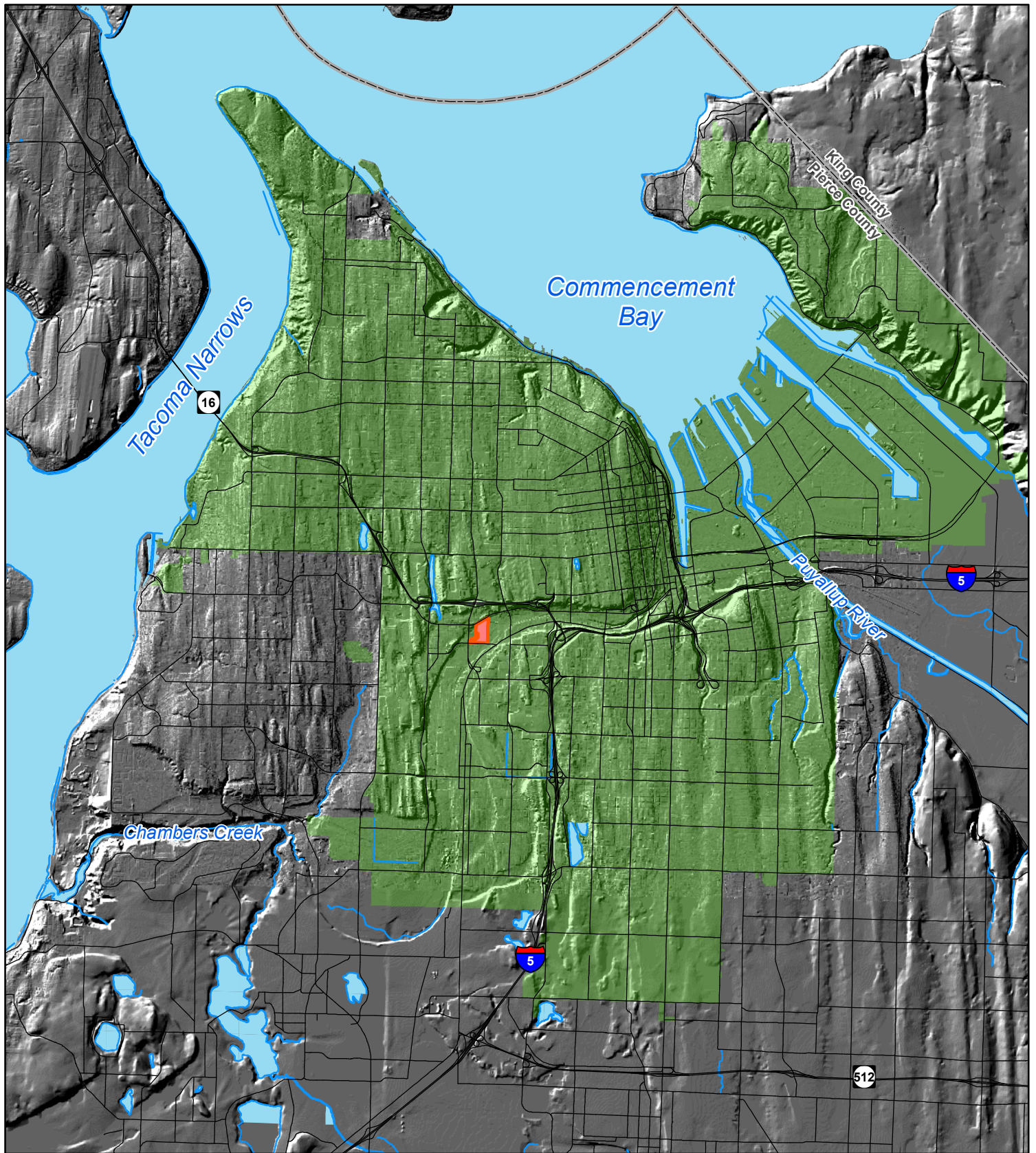
Table 1. Summary of Soil Gas Sampling Results, Birds Eye Foods Vapor Intrusion Investigation



Parameter	Units	MTCA Method C Soil Gas Screening Levels (ug/m ³)		SG-10 (Depth: 15-15.5 ft)	SG-20 (Depth: 8.5-9 ft)	SG-22 duplicate at SG-20 (Depth: 8.5-9 ft)	SG-30 (Depth: 12-12.5 ft)	SG-40 (Depth: 12-12.5 ft)
		Depth Less Than 15 feet	Depth Greater Than 15 feet					
Vacuum Measurements								
Final Field Vacuum	in Hg	NA	NA	-5	-5	-5	-5	-5
Lab Receipt Vacuum	in Hg	NA	NA	-5.5	-2.5	-3.0	-5.5	-5
Gas Measurements								
Percent Oxygen	%	NA	NA	1.5	17	15	13	20
Percent Helium	%	NA	NA	0.082 U	0.096 U	0.094 U	0.11 U	0.10 U
BTEX Compounds								
Benzene	ug/m ³	32	320	10 U	13	12	7.0	2.6 U
Ethylbenzene	ug/m ³	10,000	100,000	14 U	5.6	3.2	3.4 U	3.5 U
Toluene	ug/m ³	49,000	490,000	19	35	12	7.8	3.0 U
m,p-Xylene	ug/m ³	1,000	10,000	14 U	9.9	5.4	3.4 U	3.5 U
o-Xylene	ug/m ³	1,000	10,000	14 U	4.6	3.2 U	3.4 U	3.5 U

0.082 U = compound not detected, associated number is the lab reporting limit

Note: SG-22 duplicate sample collected immediately after SG-20

Note: Vadose zone oxygen content 4-percent or higher indicate conditions favorable to aerobic degradation of readily biodegradable petroleum components: benzene, toluene, ethylbenzene, and xylenes (Ecology, Draft Vapor Guidance)



-  Birds Eye Parcels
-  City of Tacoma

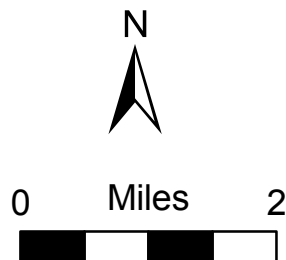
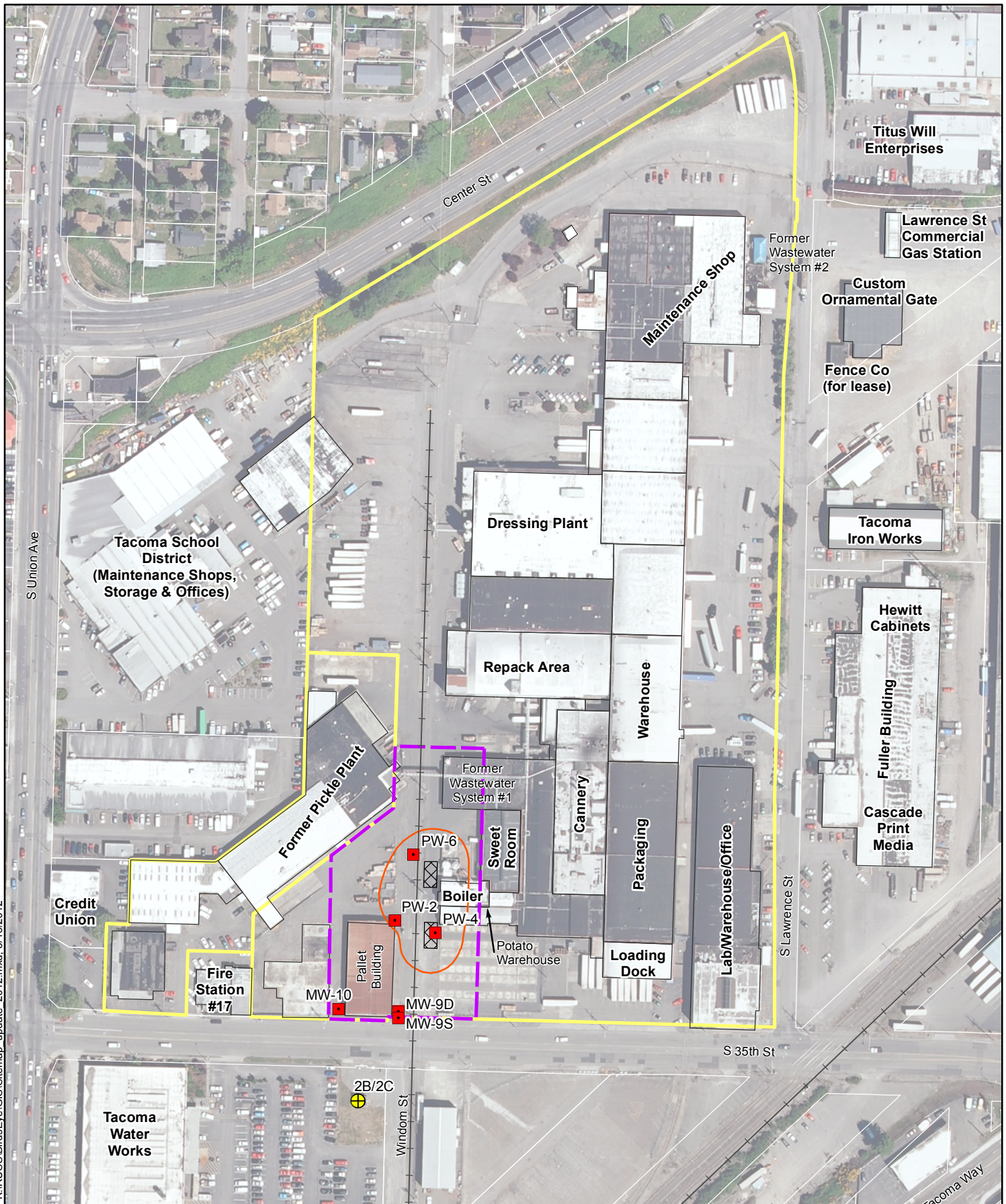


Figure 1
Site Vicinity

Birds Eye 2001 RI/FS

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- Tacoma Production Wells
- Annual Site Monitoring Wells
- Approximate UST Excavation Areas
- Boiler Room Site Vicinity
- 2011 Soil Investigation Area
- Birds Eye Parcels
- Building Footprints

0 Feet 200

2009 Orthophoto



Figure 2
Birds Eye Foods Site
and Adjacent Parcels

Vapor Intrusion Work Plan

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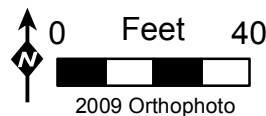
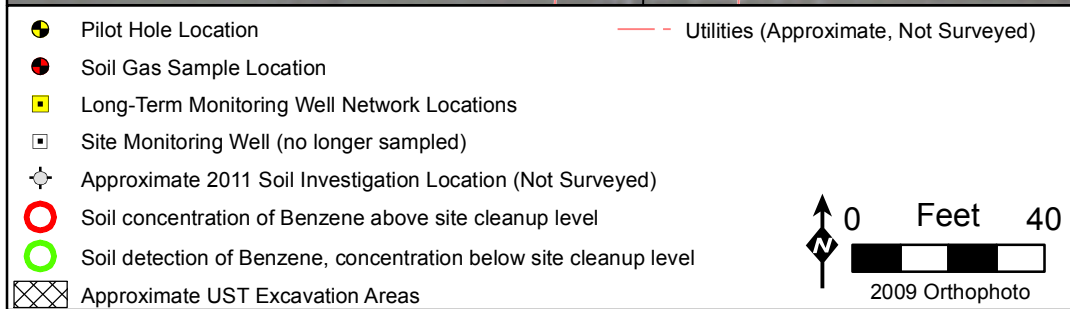
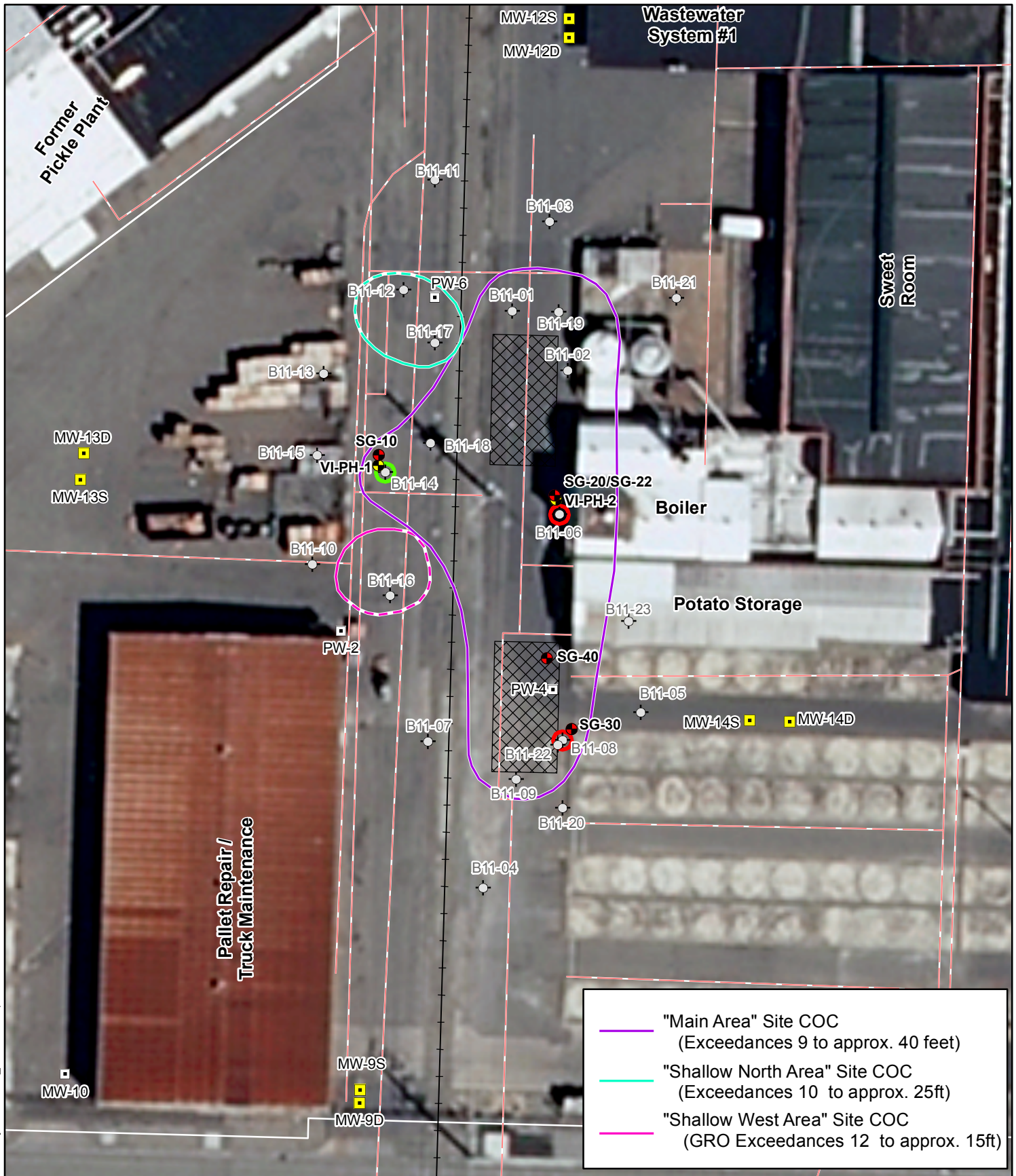
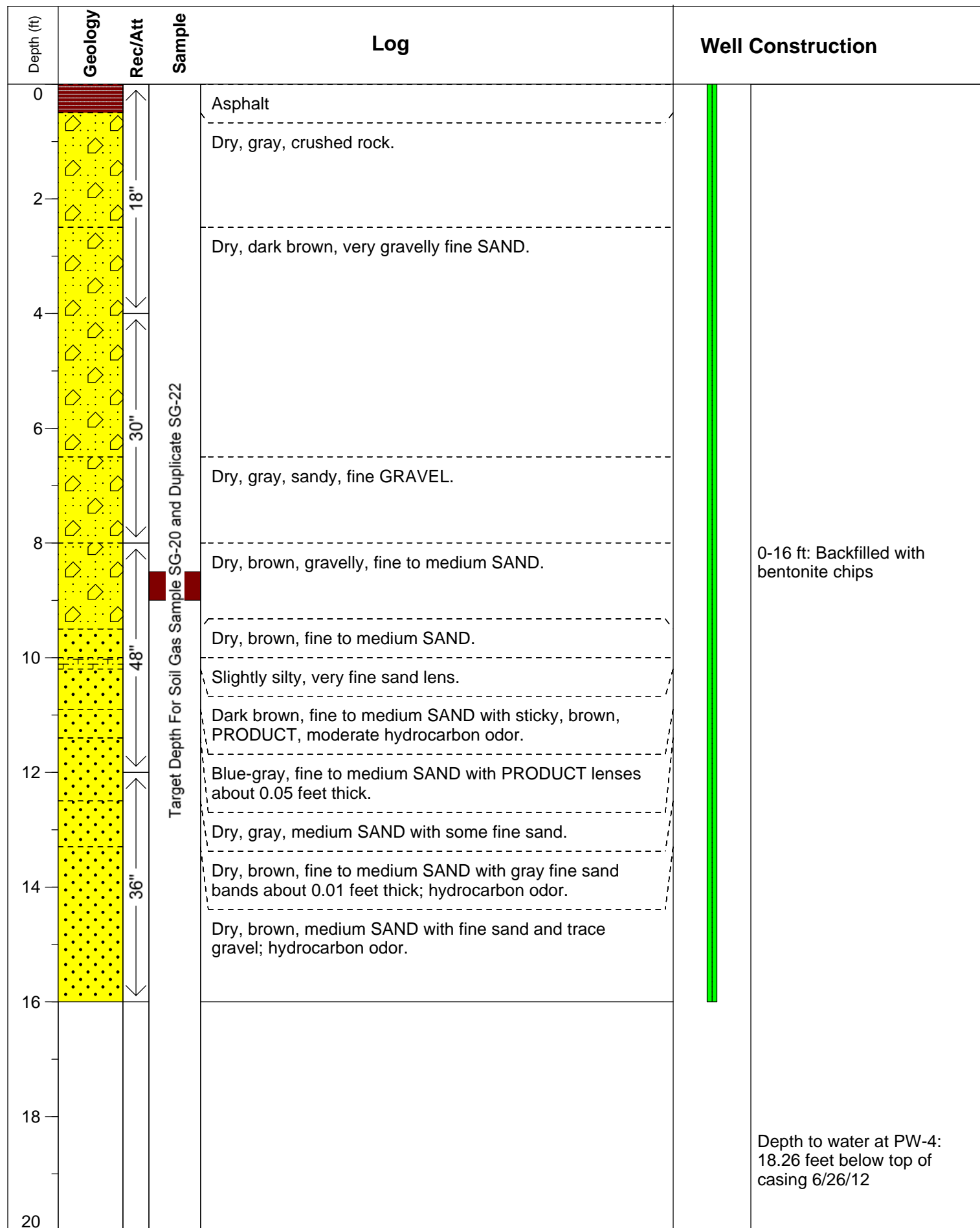


Figure 3
Soil Gas Sample
and Pilot Hole
Locations

Vapor Intrusion Study





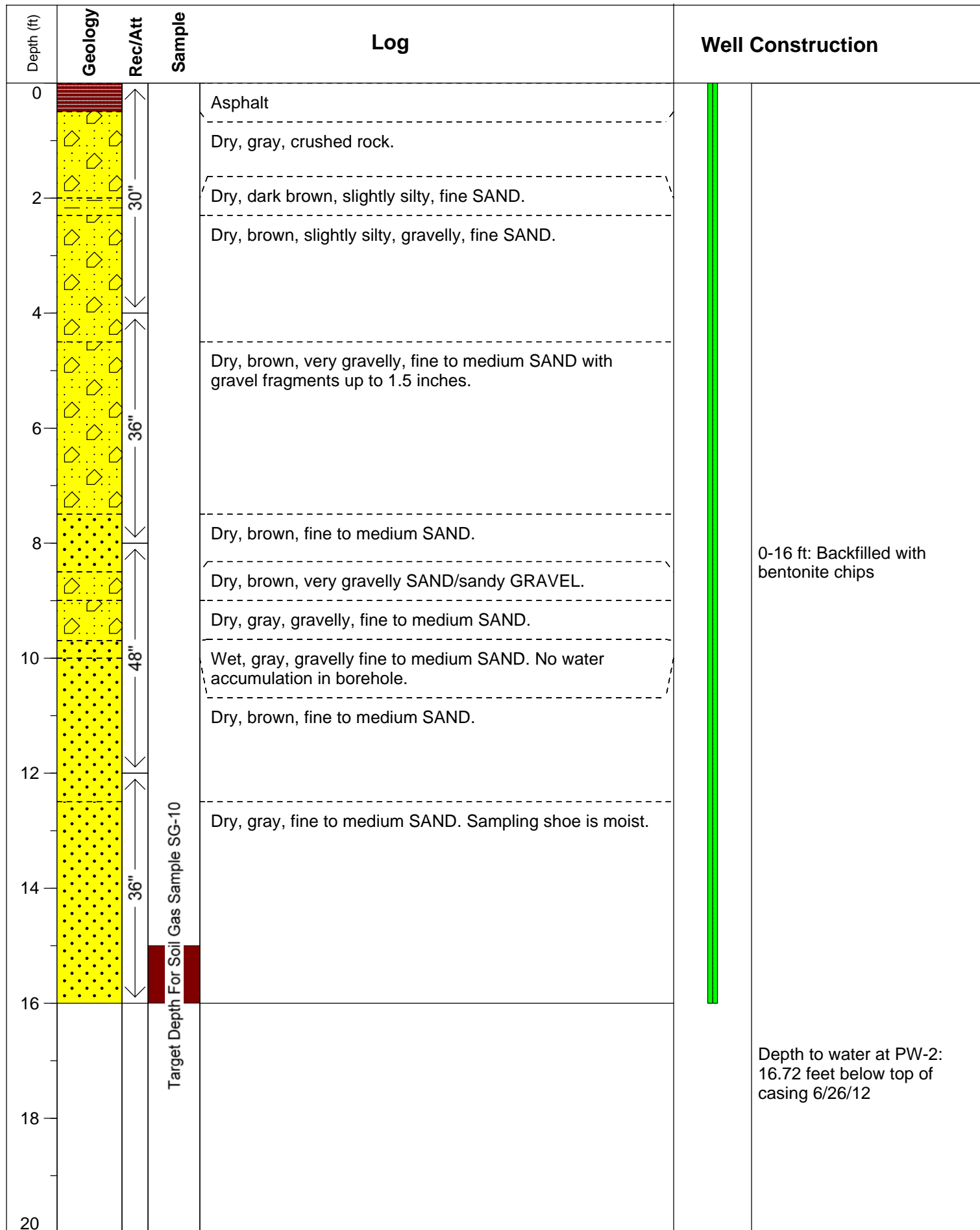
Project Name: BEF Vapor Intrusion Study
 Drilling Method: GeoProbe
 Driller: Marty Haun
 Firm: ESN Northwest
 Consulting Firm: Pacific Groundwater Group
 Logged by: I. Jackson

Borehole Name: VI-PH-1
 Ecology ID: NA
 MP Elevation:
 Datum:
 Drilled: 6/26/2012
 DTW:

FIGURE 4
GEOLOGIC LOG AND AS-BUILT
FOR BOREHOLE VI-PH-1

Birds Eye Foods Site
 Tacoma, Washington
 JI1001.02, 2/2011





Project Name: BEF Vapor Intrusion Study
 Drilling Method: GeoProbe
 Driller: Marty Haun
 Firm: ESN Northwest
 Consulting Firm: Pacific Groundwater Group
 Logged by: I. Jackson

Borehole Name: VI-PH-2
 Ecology ID: NA
 MP Elevation:
 Datum:
 Drilled: 6/26/2012
 DTW: NA

FIGURE 5
GEOLOGIC LOG AND AS-BUILT
FOR BOREHOLE VI-PH-2

Birds Eye Foods Site
 Tacoma, Washington
 JI1001.02, 2/2011



APPENDIX A
BIRDS EYE FOODS TACOMA, WA
VAPOR INTRUSION WORK PLAN
VCP SITE NUMBER SW1187

**BIRDS EYE FOODS TACOMA, WA
VAPOR INTRUSION WORK PLAN
VCP SITE NUMBER SW1187**

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March 27, 2012

J11001.03

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Table 1: Summary of 2011 BTEX Soil Results, Birds Eye Boiler Room Site

FIGURES

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Figure 2: Birds Eye Foods Site and Adjacent Parcels
Figure 3: Proposed Soil Gas Sample Locations
Figure 4: Boiler Room Site Hydrographs

1.0 INTRODUCTION

This Work Plan has been developed in response to comments made by the Washington State Department of Ecology (Ecology) regarding findings of the independent 2011 Remedial Investigation and Feasibility Study (2011 RI/FS; Pacific Groundwater Group, 2011) performed on behalf of Birds Eye Foods LLC (Birds Eye) for their facility known as Birds Eye Foods, or Former Nalley's Fine Foods, in Tacoma, Washington (Figure 1). The subject of the 2011 RI/FS is a portion of the Birds Eye facility, referred to as the "Former Boiler Room UST Site" or "Boiler Room Site" (Figure 2).

Based on the nature of contaminants in subsurface soil at the Boiler Room Site, Ecology requested that Birds Eye perform a Vapor Intrusion study to assess if volatile compounds in the subsurface pose a threat to indoor air in current or future buildings at the Site. This Work Plan provides specific guidance for field methodology that will be followed by Pacific Groundwater Group (PGG) and subcontractors on behalf of our client, Birds Eye Foods.

The Work Plan has been prepared in compliance with Ecology's *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Draft Vapor Guidance; Ecology, 2009) and developed under the Washington State Model Toxics Control Act (MTCA, Washington Administrative Code [WAC] Chapter 173-340). The Birds Eye Boiler Room Site entered Ecology's Voluntary Cleanup Program (VCP) in September 2011 and was assigned VCP Site Number SW1187.

This Work Plan was developed using generally accepted hydrogeologic practices used at this time and in this vicinity, for exclusive application to this study, and for the exclusive use of Bird's Eye Foods. This is in lieu of other warranties, express or implied.

2.0 SITE DESCRIPTION

This section provides general descriptions of the Boiler Room Site at the Birds Eye facility, including subsurface soils, groundwater levels, and contamination. Additional information is presented in the 2011 RI/FS.

2.1 FORMER BOILER ROOM UST SITE DESCRIPTION

The Birds Eye Foods facility is a former food processing facility located approximately 3 miles southwest of downtown Tacoma and the southernmost tip of Commencement Bay (Figure 1). Locally, the facility is also known as Nalley's Fine Foods, the original food processing company at this location.

The subject of the 2011 RI/FS and this Vapor Intrusion Work Plan is a portion of the Birds Eye facility, referred to as the "Former Boiler Room UST Site" or "Boiler Room Site" (Figure 2). The Boiler Room Site is located in the south-western portion of the Birds Eye facility.

As presented in Figures 2 and 3, the Boiler Room Site is located in the main internal vehicle corridor through the facility. A railroad spur, overhead power lines, and underground utilities transect the Site as described in the 2011 RI/FS. Three buildings are located in the vicinity of the Boiler Room Site: the Potato Warehouse (currently vacant), the Boiler Room Building, and the former Pallet Room Building (currently vacant).

The Boiler Room Site is largely paved or covered with buildings. Crushed rock and gravel lies between the rails in the southern 350 feet of track and to approximately 2.5 feet on either side of the rails. There is also a gravel covered area approximately 1,200 square feet along the southern 100 feet of track.

Two underground storage tanks (USTs) were removed from the Boiler Room Site in 1990. Soil at the Site is impacted with petroleum compounds from former UST releases of diesel and Bunker C fuels. The 2011 RI/FS assessed the nature and extent of soil contamination at the Boiler Room Site and concluded that non-aqueous phase liquid (NAPL) is present in soil and that dissolution of the contaminant mass to groundwater is no longer occurring. Information on the nature of Site contamination is presented in Section 2.4 of the Work Plan and in the 2011 RI/FS. This is a mature Site and not the result of a recent or new release of hazardous materials to the subsurface.

2.2 LAND AND BUILDING USE

The Birds Eye property is zoned by the City of Tacoma as Heavy Industrial (M2) with South Tacoma Groundwater Protection District and South Tacoma Manufacturing/Industrial Center overlays. The surrounding properties are zoned as heavy or light industrial with the same overlays as the Birds Eye facility.

The Birds Eye facility is no longer operational. Food production ceased in June 2011 and subsequent warehousing and distribution activities ended in December 2011. The property is currently for sale. Future land use is unknown, but will likely be industrial given the industrial and commercial zoning of the Nalley Valley and surrounding property use. Also, due to its proximity to other industrial properties and its value as industrial property, it is not likely that zoning will change in the future and there is no intent to change it.

Three buildings are located in the vicinity of the Boiler Room Site: the Potato Warehouse (currently vacant), the former Pallet Room Building (currently vacant), and the Boiler Room Building. The Potato Warehouse was formerly used for storage and is not an enclosed space as it is drafty with a large loading bay or garage-style door. The Potato Warehouse does not have a forced air style heating system. The Pallet Room Building was formerly used to re-build wooden pallets. It has large loading bay or garage-style doors and does have a heating system. The Boiler Room has a large bay-style door, is not insulated, and does not have a separate heating system. The Boiler Room does have an exhaust system that vented the boilers when operating.

The existing buildings were not used as office space and the current conditions of the buildings are not suited for offices. Construction details for the buildings are unknown; however, following a site inspection a remedial engineer made the following assessment:

While it is not known for certain, it is assumed that both of these buildings [sic the Potato Warehouse and Boiler Room] are founded on shallow spread footings. The Potato Warehouse is wood framed and relatively flexible but it shares a wall with the adjacent Boiler Room building. The Boiler Room building has concrete block walls and will be more brittle (PGG, 2011).

Plans for buildings that may be constructed in the future in the vicinity of the Boiler Room are unknown.

2.3 VADOSE ZONE HYDROGEOLOGIC UNITS AND GROUNDWATER

The following discussion is based on information presented in the 2011 RI/FS. The Site geology and hydrogeology have been investigated through numerous drilling tasks performed at the Birds Eye facility. The Vapor Intrusion investigation will focus on the vadose zone. Two stratigraphic units were encountered in the vadose zone in at the Site:

- Fill
- Upper Sand (unsaturated portions)

Significant low-permeability layers in the vadose zone have not been identified at the Site.

Fill

A layer of structural fill, approximately 4 to 12 feet thick and consisting of sand and gravel occurs at ground surface at the Boiler Room Site. The fill is approximately 15 to 19 feet thick where it was used to backfill the former UST excavations. The lateral extent of fill is unknown. The unit is generally not saturated with groundwater, although fill in the former tank excavations may be saturated at seasonally high groundwater periods. Field observations suggest this unit is relatively permeable.

Upper Sand

The Upper Sand is the shallowest naturally occurring unit at the Site. It is a 30 to 50 foot thick layer of fine to medium sand with minor gravel. At the Boiler Room Site the water table occurs in the Upper Sand unit. Depth to groundwater in Site wells is typically 23 to 28 feet below ground; however the minimum and maximum measured at the Site are about 18 and 30 feet, respectively (Figure 4).

2.4 BOILER ROOM SITE CONSTITUENTS OF CONCERN

The sources of soil contamination at the Boiler Room Site were releases of diesel and Bunker C fuel from former USTs that were used to fuel the facility boilers. Gasoline was not stored at the Boiler Room Site.

The constituents of concern (COC) identified for the Boiler Room Site in the 2011 RI/FS for soil are:

- Total Petroleum Hydrocarbons (TPH) including gasoline-, diesel-, and motor oil-range hydrocarbons
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)

During the 2011 Site investigations, the lab analyst noted that the soil chromatogram peaks in the gasoline-range did not match the pattern of an identifiable gasoline chromatogram. The gasoline-range organics present in the Site soil are likely degraded from the original diesel and Bunker C releases.

The constituent list for long-term groundwater monitoring also includes polycyclic aromatic hydrocarbons (PAHs).

The 2011 RI/FS concluded that a NAPL body is present in the Fill and Upper Sand units at the Boiler Room Site that is functionally stable. The Soil-NAPL body is present below the water table with the exception of the B11-09 area (Figure 3) where it was encountered slightly above the water table. The Soil-NAPL body has concentrations of TPH compounds and benzene above MTCA Method A Industrial cleanup levels for soil (Figure 3). Long-term groundwater monitoring indicates that dissolution of the contaminant mass to groundwater is no longer occurring.

3.0 VAPOR INTRUSION WORK PLAN

This section presents the scope of work for the Vapor Intrusion investigation to be conducted at the Boiler Room Site. The objective of the investigation is to assess if volatile compounds present in the Boiler Room Site subsurface are of significant strength to pose a potential vapor intrusion threat to existing or future buildings at the Site.

Ecology's Draft Vapor Intrusion Guidance has a tiered approach to evaluate if concentrations of volatile substances are high enough to pose a potentially unacceptable threat to indoor air quality in current or future buildings depending on the subsurface source:

- Shallow Groundwater Source (only): use measured groundwater concentrations or soil gas concentrations
- Vadose Zone Soil Source (only): use measured soil gas concentrations
- Shallow Groundwater and Vadose Zone Soil Sources: use measured soil gas concentrations
- LNAPL Source (on top of the water table): use measured soil gas concentrations

Based on observations of NAPL at the Boiler Room Site, soil gas is the Ecology-recommended media to evaluate potential vapor intrusion.

3.1 SAMPLE PARAMETERS

Substances that could potentially contaminant indoor air to unacceptable levels through the vapor intrusion pathway are identified in the Draft Vapor Guidance. Of the Boiler Room Site chemicals of concern, those with a potential vapor intrusion pathway are the

BTEX compounds. Benzene is the most toxic volatile organic compound detected in soil at the Boiler Room Site and is therefore the driver for the Vapor Intrusion investigation.

Soil gas samples collected for this Vapor Intrusion investigation will be analyzed for BTEX compounds by EPA Method TO-15. In addition, the soil gas samples will be analyzed for oxygen content to assess if site conditions are favorable to aerobic degradation. Analytical services will be provided by a Washington State accredited lab.

3.2 TIME OF SAMPLING

Ecology recommends that soil gas sampling be avoided during or immediately following a heavy rain event because it can affect the representativeness of the soil gas sample. However, it may not be practical to collect soil gas samples under optimal weather conditions, as sampling will be scheduled weeks in advance with subcontractors. Other factors that can impact the degree of vapor intrusion from soil gas include the height of the water table and temperature of soil and groundwater.

3.3 SOIL GAS SAMPLING LOCATIONS AND RATIONALE

During the 2011 RI/FS, BTEX compounds were analyzed in 45 soil samples collected from 16 boreholes drilled at the Boiler Room Site (Table 1). Benzene was only detected in the following samples:

- B11-06: samples collected from 25 and 30 feet below ground
- B11-08: samples collected from 20, 25, and 30 feet below ground
- B11-14: sample collected from 30 feet below ground

Of these three locations and six samples, benzene concentrations exceeded MTCA Method A Industrial soil cleanup levels in three samples: the B11-06 30 foot sample and the B11-08 25 and 30 foot samples. Borehole locations are presented in Figure 3.

Ethylbenzene and xylenes were detected in 9 and 11 soil samples respectively, but at concentrations that did not exceed MTCA Method A Industrial soil cleanup levels. Toluene was not detected in the Site soil samples.

Four soil gas samples are proposed to assess potential vapor intrusion at the Site (Figure 3). Soil gas locations are proposed where the highest concentrations of benzene were measured in Site soil (Table 1). Because these locations are outside the existing buildings, sub-slab soil gas samples will not be collected. Instead, samples will be collected just above the contaminant source or above the capillary zone, whichever is shallower. Based on the 2011 RI/FS benzene results, most samples will be collected at or deeper than 15 feet below ground. Due to the possibility of diluting the collected soil gas sample with atmospheric air, samples should not be collected from depths shallower than 5 feet.

3.4 SOIL GAS SAMPLING METHODOLOGY

Soil gas samples will be collected from probes advanced to the target sampling depth by direct-push drilling methods. The Post Run Tubing (PRT) system or similar will be used to isolate the soil gas sample from the steel drive rods and to minimize possible leaks of ambient air from the rod joints. In accordance with Ecology's Draft Vapor Guidance, Summa canisters will be used to collect the samples. Grab samples will be collected over a short time interval; integrated samples (collected over 8-24 hours) are not proposed.

Before mobilizing to the field for soil gas sampling, underground utilities in the drilling vicinity will be marked by public and private locators. Upon receipt of the Summa canisters from the analytical lab, the initial vacuum of each canister will be verified and recorded.

At the proposed soil gas sample locations near B11-06 and B11-14 (Figure 3), a licensed driller will advance pilot boreholes to the water table. Because the detections of benzene in Site soils are below the water table, the purposes of the pilot boreholes are to confirm the depth to water at the time of drilling so soil gas samples are collected from the vadose zone. Pilot boreholes may not be drilled at the other soil gas sample locations if the water level is instead measured in monitoring well PW-4 (Figure 3). Soil cores from the pilot boreholes will be retrieved at 4 or 5 foot intervals and visually inspected and logged in the field by a PGG hydrogeologist. Significant subsurface characterization has been performed at the Boiler Room Site and continuous cores and logs will not be maintained. Pilot boreholes will be decommissioned following appropriate state standards.

Based on the pilot borehole log or water level measurement, the PGG hydrogeologist will identify a depth above the water table to collect a soil gas sample. A second borehole adjacent to the pilot borehole will be advanced to the target soil gas sample interval and the following protocol will be used to collect the soil gas sample:

- At the target sample interval, lower disposable tubing with a PRT adapter to the bottom of the rods and thread the adapter onto the point holder in the bottom of the rods.
- Perform a leak test of the PRT tubing system by applying vacuum to the tubing.
- Pull back the probe rods approximately 1 foot to provide an open cylinder in the soil through which the soil gas may be sampled.
- Place a surface seal of hydrated bentonite around the outside of the drill rod to inhibit surface air migration down the outer portion of the drill rod.
- Allow a minimum of 20 minutes to pass since the drill rod was sealed at ground surface and purge the sample tubing a minimum of three casing volumes. A peristaltic pump, vacuum/volume system, purge canister/manifold system, syringe, or similar may be used to purge the tubing. Collectively this equipment is referred to as the sample train. Following purging, clamps or valves should be used to minimize backflow of atmospheric air into the tubing.
- Attach a Summa canister with a pressure gage, flow regulator, and particulate filter to the sample train. Record the start time of sample collection on the field notes. Fill the Summa Canister at less than 200 mL/minute to prevent stripping of volatiles.

- If using a peristaltic pump, open the valve or release the clamp on the flexible tubing and immediately open the flow control device on the canister.
- Close the sample canister valve when the gage indicates approximately 5 inches Hg vacuum and then disconnect the canister from the tubing. Place an identification label on the canister.
- Record the time sample collection was stopped in the field notes.
- Discard sample tubing, retrieve probe rods, and decommission the borehole in accordance with Washington State regulations.

3.5 SAMPLE HANDLING

Sample containers will be labeled with sample identification, date and time of sample collection, and starting and ending canister pressures. This information will also be recorded in field notes and pertinent information will be transferred to the chain-of-custody. All Summa canisters will be packed in the original shipping containers and sent to the analytical lab. Soil gas samples have a 30-day holding time and must be stored in a clean environment.

3.6 QUALITY CONTROL FOR SOIL GAS SAMPLING

No field quality control samples will be collected for soil gas samples. Duplicate samples will not be collected because there is no adequate method to collect a duplicate sample using Summa canisters. Quality control will be performed by the laboratory in compliance with the analytical method.

3.7 SCREENING LEVELS

MTCA Industrial air cleanup levels would be appropriate for current and future buildings at the Boiler Room Site based on current land use and the expectation that future land use will remain industrial. Industrial air cleanup levels are established under MTCA Method C and are tabulated in the Draft Vapor Guidance:

Constituent	Soil Gas Screening Levels (ug/m ³)	
	Sample Shallower than 15 feet	Sample 15 feet or deeper
Benzene	32	320
Ethylbenzene	10,000	100,000
Toluene	49,000	490,000
Xylenes	1,000	10,000

Soil gas concentrations will be compared to the screening levels tabulated above. Oxygen percentages in soil gas samples that are greater than 4-percent indicate that subsurface conditions are favorable to aerobic degradation. If the oxygen percent in the Boiler Room soil gas samples exceed 4-percent, the screening levels presented above for samples collected 15 feet or deeper will be increased by a factor of ten.

If measured soil gas concentrations exceed the screening levels, the results will be input to a model, like the Johnson and Ettinger model, and used to predict indoor air concentrations.

3.8 REPORTING

A concise Vapor Intrusion Investigation report will be developed for Ecology submittal that documents the field investigation, summarizes analytical results, evaluates the soil gas results relative to screening levels, and presents recommendations.

4.0 REFERENCES

Pacific Groundwater Group. December 16, 2011. Birds Eye Foods Tacoma, WA 2011 Remedial Investigation/Feasibility Study.

Washington State Department of Ecology. October 2009. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Review Draft. Publication No. 09-09-047

Table 1. Summary of 2011 BTEX Soil Results, Birds Eye Boiler Room Site

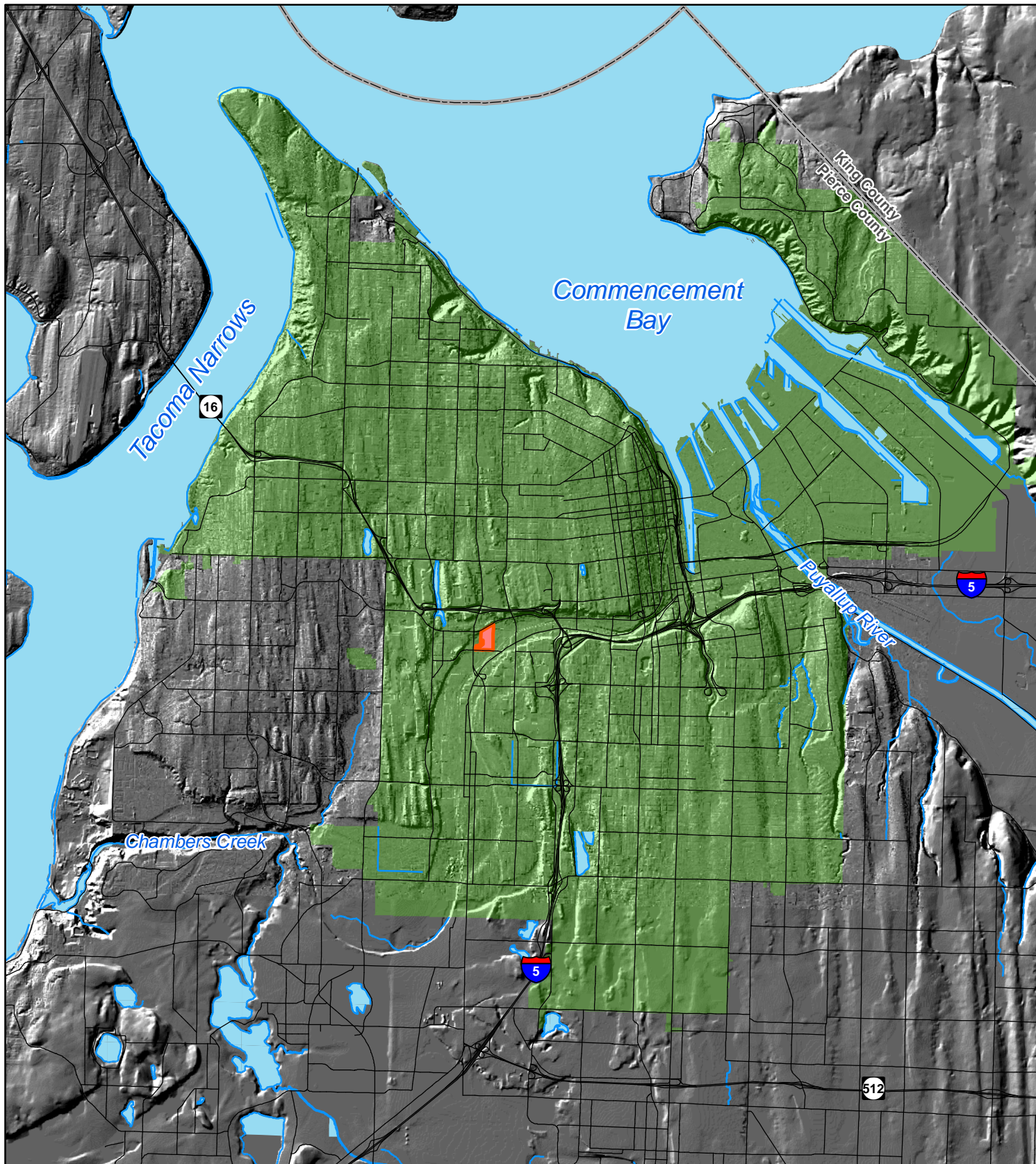
Investigation	Sample ID (borehole ID- sample depth in feet bgs)	Units	Benzene	Ethylbenzene	Toluene	o-Xylene	m+p Xylenes	Sum of Xylenes	Xylenes, Total
			MTCA Method A Industrial Land Use Cleanup Levels:						
			30 ug/kg	6,000 ug/kg	7,000 ug/kg	Not Established	Not Established	9,000 ug/kg	9,000 ug/kg
Jan-11	B11-01-20	ug/kg	13 U	13 U	13 U	13 U	27 U	Xylenes not detected	---
Jan-11	B11-01-30	ug/kg	9.9 U	130 U	130 U	690	2,000	2,690	---
Jan-11	B11-03-24	ug/kg	17 U	17 U	17 U	17 U	34 U	Xylenes not detected	---
Jan-11	B11-06-15	ug/kg	9.8 U	9.8 U	9.8 U	9.8 U	20 U	Xylenes not detected	---
Jan-11	B11-06-20	ug/kg	11 U	44 U	44 U	180	290	470	---
Jan-11	B11-06-25	ug/kg	30	55 U	55 U	270	570	840	---
Jan-11	B11-06-30	ug/kg	290	280	52 U	360	100 U	360	---
Jan-11	B11-08-20	ug/kg	19	950	44 U	240	88 U	240	---
Jan-11	B11-08-25	ug/kg	80	1,300	50 U	210	130	340	---
Jan-11	B11-08-30	ug/kg	880	2,600	46 U	420	2,700	3,120	---
Jan-11	B11-09-23.5	ug/kg	10 U	100	10 U	56	36	92	---
Jan-11	B11-11-10	ug/kg	16 U	16 U	16 U	16 U	32 U	Xylenes not detected	---
Jan-11	B11-12-10	ug/kg	12 U	1,100	57 U	710	200	910	---
Jan-11	B11-12-15	ug/kg	11 U	13 U	13 U	13 U	27 U	Xylenes not detected	---
Jan-11	B11-12-20	ug/kg	14 U	14 U	14 U	14 U	28 U	Xylenes not detected	---
Jan-11	B11-14-09	ug/kg	14 U	14 U	14 U	14 U	27 U	Xylenes not detected	---
Jan-11	B11-14-30	ug/kg	16	2,400	950 U	950 U	1,900 U	Xylenes not detected	---
Jan-11	B11-16-12	ug/kg	12 U	150 U	150 U	290	300 U	290	---
Jan-11	B11-17-10	ug/kg	12 U	1,000	150 U	150 U	300 U	Xylenes not detected	---
Jan-11	B11-17-15	ug/kg	16 U	16 U	16 U	16 U	32 U	Xylenes not detected	---
Jan-11	B11-17-20	ug/kg	16 U	16 U	16 U	16 U	32 U	Xylenes not detected	---
Jan-11	B11-17-30	ug/kg	12 U	1,200 U	1,200 U	1,200 U	2,400 U	Xylenes not detected	---
Jul-11	B11-18-40	ug/kg	20 U	37	20 U	---	---	---	110
Jul-11	B11-18-51	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-18-52	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-19-45	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-19-50	ug/kg	20 U	20 U	20 U	---	---	---	60 U



Table 1. Summary of 2011 BTEX Soil Results, Birds Eye Boiler Room Site

Investigation	Sample ID (borehole ID- sample depth in feet bgs)	Units	Benzene	Ethylbenzene	Toluene	o-Xylene	m+p Xylenes	Sum of Xylenes	Xylenes, Total
			MTCA Method A Industrial Land Use Cleanup Levels:						
			30 ug/kg	6,000 ug/kg	7,000 ug/kg	Not Established	Not Established	9,000 ug/kg	9,000 ug/kg
Jul-11	B11-19-55	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-20-32	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-16	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-21	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-25	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-30	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-35	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-50	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-21-55	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-22-38	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-15	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-20	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-25	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-35	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-40	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-45	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-50	ug/kg	20 U	20 U	20 U	---	---	---	60 U
Jul-11	B11-23-55	ug/kg	20 U	20 U	20 U	---	---	---	60 U

U: compound not detected, number associated is the lab reporting limit

Bold Red: concentration exceeds MTCA Method A Cleanup Level



-  Birds Eye Parcels
-  City of Tacoma

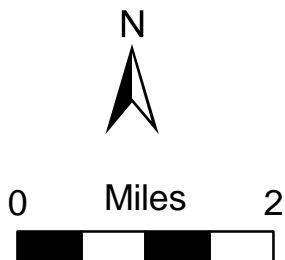
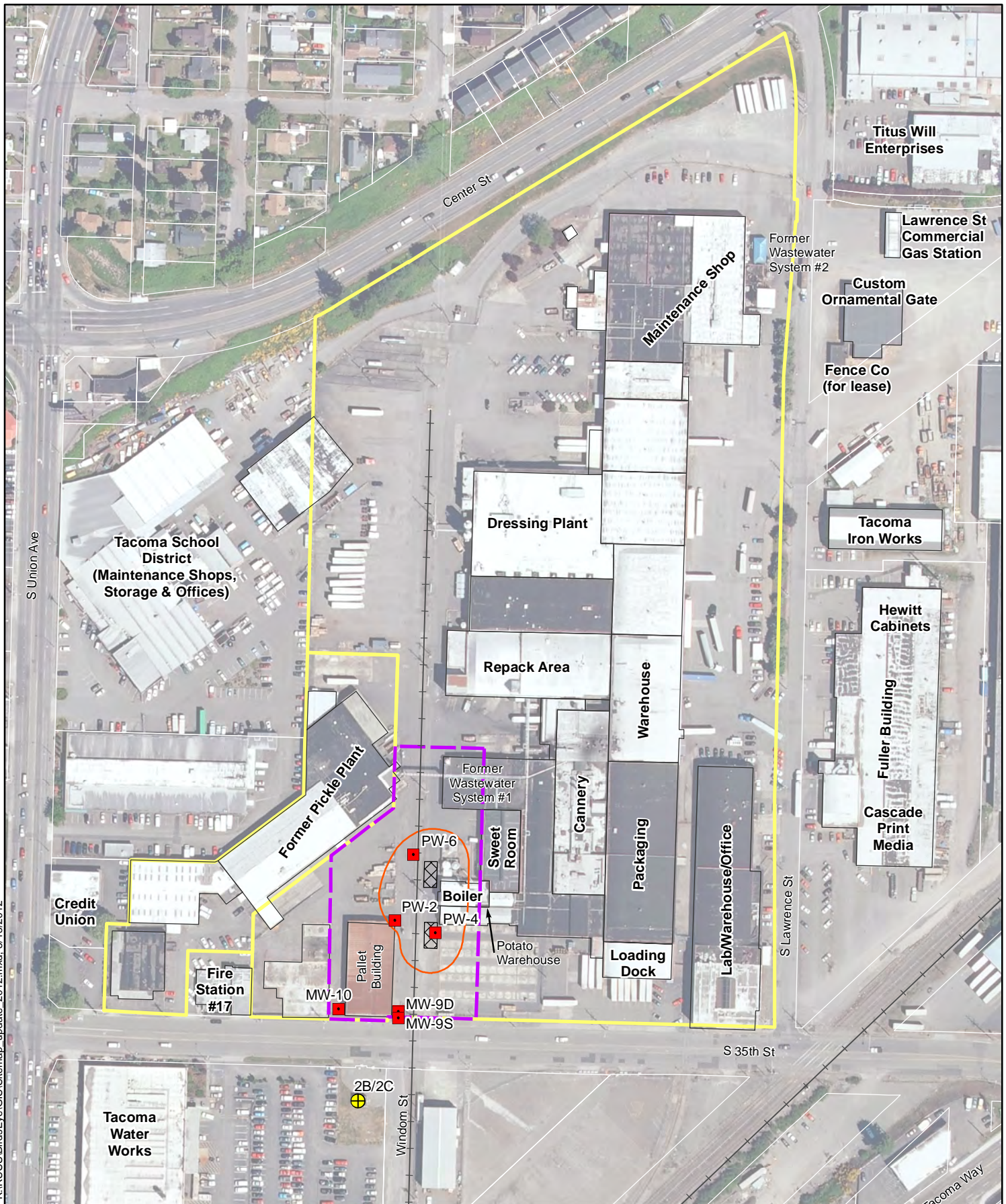


Figure 1
Site Vicinity

Birds Eye 2001 RI/FS





- Tacoma Production Wells
- Annual Site Monitoring Wells
- Approximate UST Excavation Areas
- Boiler Room Site Vicinity
- 2011 Soil Investigation Area
- Birds Eye Parcels
- Building Footprints

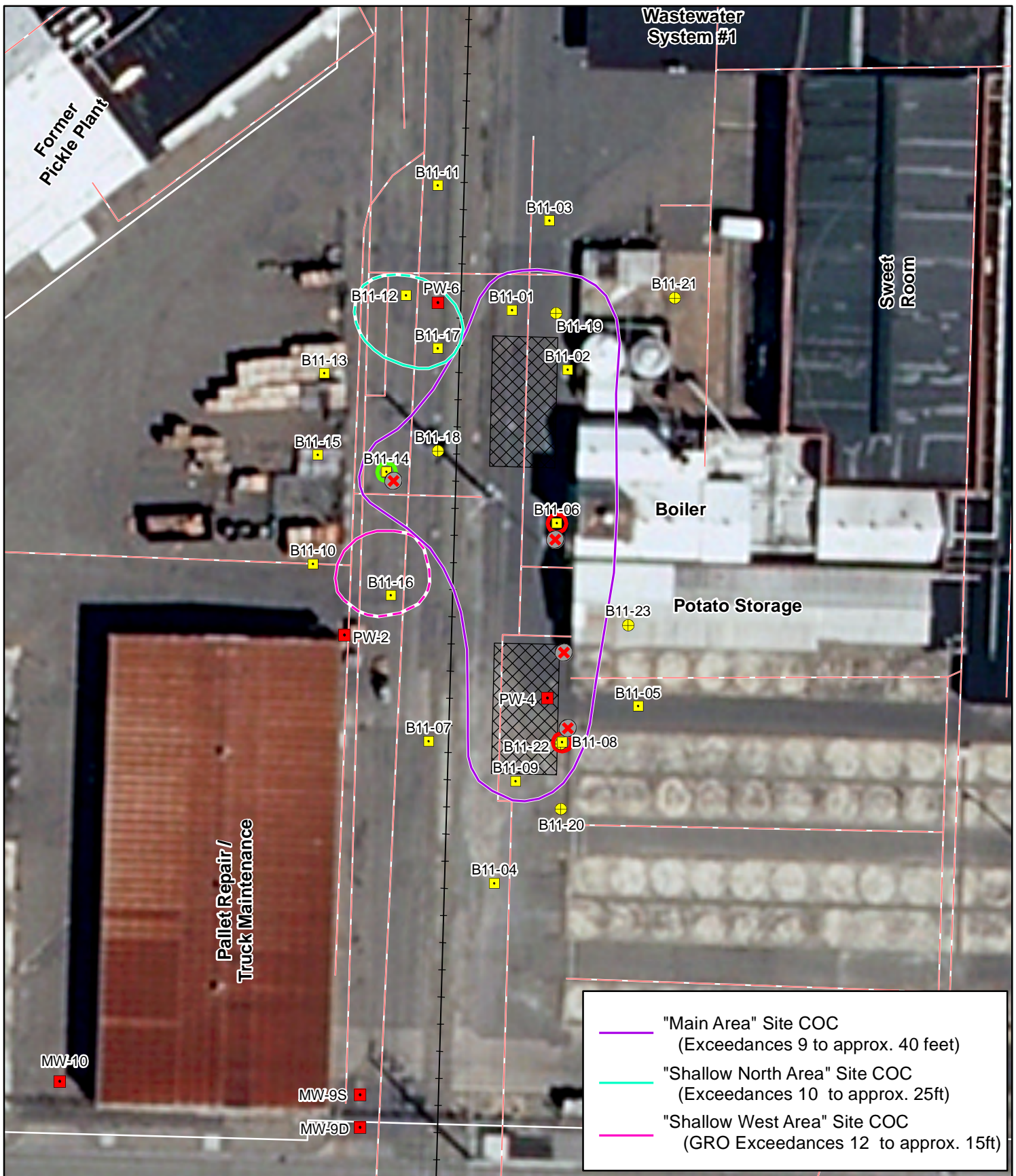
0 Feet 200
2009 Orthophoto



Figure 2
Birds Eye Foods Site
and Adjacent Parcels

Vapor Intrusion Work Plan

pgg



- ⊗ Proposed Soil Gas Sample Location
- Soil concentration of Benzene above site cleanup level
- Soil detection of Benzene, concentration below site cleanup level
- Approximate Jan/Feb 2011 Direct Push Boring Location (Not Surveyed)
- ⊕ Approximate July 2011 HSA Boring Location (Not Surveyed)
- Annual Site Monitoring Wells
- Approximate UST Excavation Areas
- Utilities (Approximate, Not Surveyed)

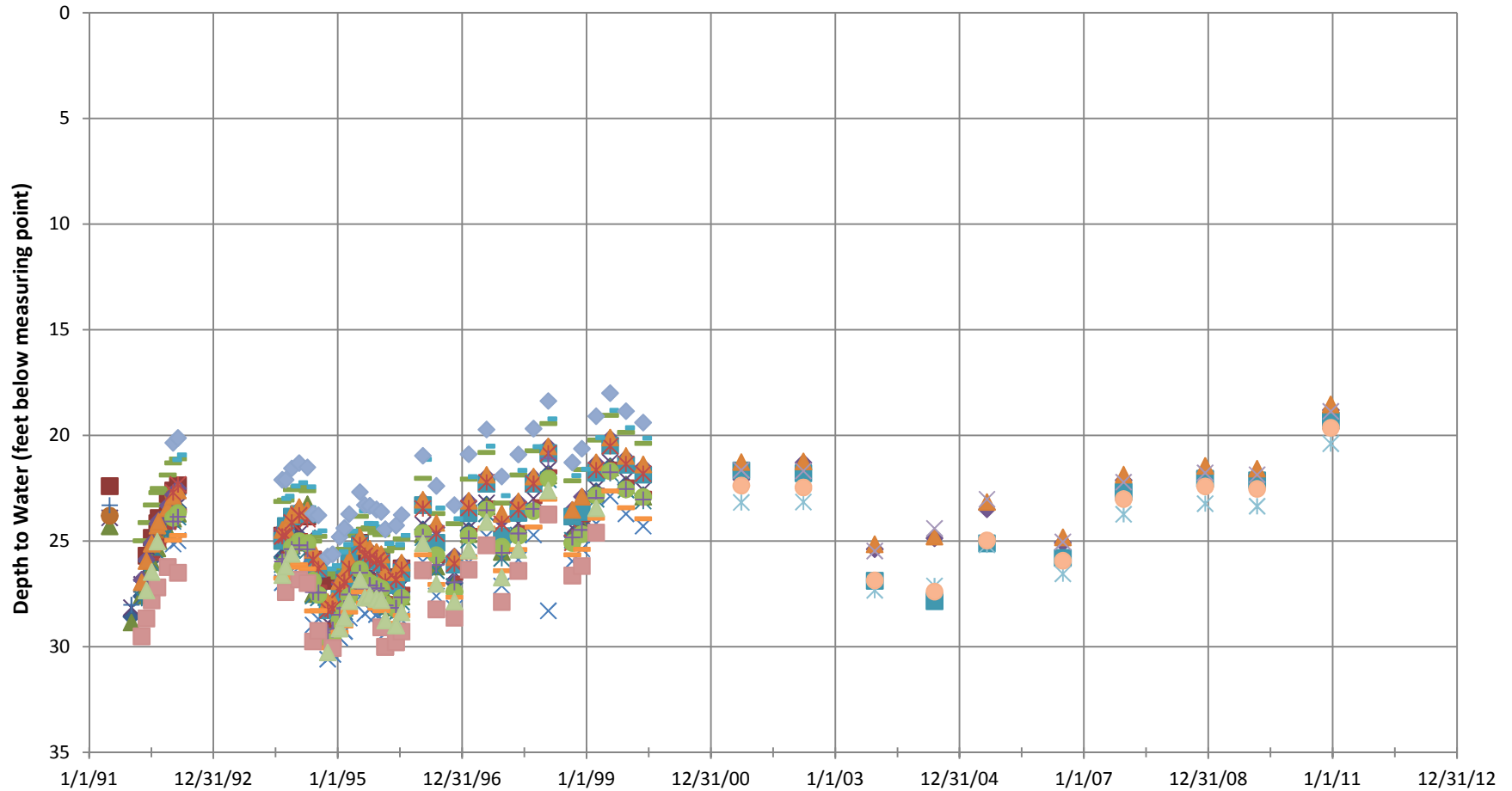


0 Feet 40
2009 Orthophoto

Figure 3
Proposed
Soil Gas
Sample Locations

Vapor Intrusion Work Plan





◆ MW-1 ■ MW-2 ▲ MW-3 ✕ MW-4S ✕ MW-4D ● MW-5 + MW-6 - MW-7
 — MW-8 ◆ MW-9s ■ MW-9d ▲ MW-10 ✕ MW-11 ✕ P-1 ● P-2 + P-3
 — P-4 — P-5 ◆ P-6 ■ HC-7 ▲ WELL 2B ✕ PW-2 ✕ PW-4 ● PW-6

Site monitoring wells completed with flush monuments. Depth to water below the well measuring points approximates depth to water below ground surface.

Figure 4
Boiler Room Site Hydrographs

Birds Eye 2011 RI/FS

APPENDIX B
AIR TOXICS LAB REPORTS



Air Toxics Ltd.

CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Page ____ of ____

Project Manager AT: Kelly Buether; AG: Inger Jackson
 Collected by: (Print and Sign) Inger Jackson
 Company Pacific Groundwater Group Email inger@pwwg.com
 Address 2377 Eastlake Ave E City Seattle State WA Zip 98102
 Phone 206 329 0144 Fax 206 329 6968

Project Info:

P.O. # J11001-04

Project #

Project Name Birds Eye

Turn Around Time:

☐ Normal

☒ Rush

5 Bus. Day
specify

Lab Use Only

Pressurized by:

Date:

Pressurization Gas:

N₂

He

Lab I.D.	Field Sample I.D. (Location)	Handwritten Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum		
						Initial	Final	Receipt Final (ps)
01A	SG-10 (shipped separately)	30811	7/3/2012	1004	TD-15 (sk)-BTX only ASTMD-PHLO He-E ₂	-30	-5	
02A	SG-20	33718	7/3/2012	1048	Attached ↓ ↓ ↓ ↓ ↓	-29	-5	
03A	SG-22	2062	7/3/2012	1100		-30	-5	
04A	SG-30	99383AT	7/3/2012	1155		-30	-4	
05A	SG-30-2	37732	7/3/2012	1223		-30	-5	
06A	SG-40	36374	7/3/2012	1255		-29 3/4	-5	
	Inger Jackson to consult with K. Buether before analysis of SG-30 and SG-30-2.							

Relinquished by: (signature) <u>[Signature]</u> Date/Time <u>7/3/2012 1551</u>	Received by: (signature) <u>[Signature]</u> Date/Time <u>7.5.12 0955</u>	Notes: Benzene RL < 32 µg/m ³ Ethylbenzene RL < 10,000 µg/m ³ Toluene RL < 49,000 µg/m ³ Xylenes RL < 1,000 µg/m ³ *See Attached.
Relinquished by: (signature) <u>[Signature]</u> Date/Time	Received by: (signature) <u>[Signature]</u> Date/Time	
Relinquished by: (signature) <u>[Signature]</u> Date/Time	Received by: (signature) <u>[Signature]</u> Date/Time	

Lab Use Only	Shipper Name <u>UPS</u>	Air Bill # <u>12 919 657 01 5344 7223</u>	Temp (°C) <u>NA</u>	Condition <u>green</u>	Custody Seals Intact? <u>Yes</u>	Work Order # <u>1207065</u>
--------------	-------------------------	---	---------------------	------------------------	----------------------------------	-----------------------------

Method: TO-15 (Sh)-BTEX only

1207065

Compound	Rpt.Limit(ppbv)
Benzene	0.50
Ethyl Benzene	0.50
Toluene	0.50
m,p-Xylene	0.50
o-Xylene	0.50

Surrogate	Method Limits
1,2-Dichloroethane-d4	70-130
Toluene-d8	70-130
4-Bromofluorobenzene	70-130

Reporting limits cited do not take into account sample dilution due to canister pressurization.

A Eurofins Lancaster Laboratories Company

Eurofins Air Toxics, Inc.

180 Blue Ravine Road, Suite B
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F : 916-985-1020
www.airtoxics.com

7/12/2012

Ms. Inger Jackson
Pacific Groundwater Group
2377 Eastlake Avenue East

Seattle WA 98102

Project Name: Birds Eye
Project #:
Workorder #: 1207065A

Dear Ms. Inger Jackson

The following report includes the data for the above referenced project for sample(s) received on 7/5/2012 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner
Project Manager

WORK ORDER #: 1207065A

Work Order Summary

CLIENT:	Ms. Inger Jackson Pacific Groundwater Group 2377 Eastlake Avenue East Seattle, WA 98102	BILL TO:	Ms. Inger Jackson Pacific Groundwater Group 2377 Eastlake Avenue East Seattle, WA 98102
PHONE:	206-329-0141x204	P.O. #	JI1001.04
FAX:		PROJECT #	Birds Eye
DATE RECEIVED:	07/05/2012	CONTACT:	Kelly Buettner
DATE COMPLETED:	07/12/2012		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SG-10	Modified TO-15	5.5 "Hg	5 psi
02A	SG-20	Modified TO-15	2.5 "Hg	5 psi
03A	SG-22	Modified TO-15	3.0 "Hg	5 psi
04A	SG-30	Modified TO-15	4.5 "Hg	5 psi
05A(on hold)	SG-30-2	Modified TO-15	5.5 "Hg	5 psi
06A	SG-40	Modified TO-15	5.0 "Hg	5 psi
07A	Lab Blank	Modified TO-15	NA	NA
08A	CCV	Modified TO-15	NA	NA
09A	LCS	Modified TO-15	NA	NA
09AA	LCSD	Modified TO-15	NA	NA

CERTIFIED BY:



Technical Director

DATE: 07/12/12

Certification numbers: AZ Licensure AZ0719, CA NELAP - 02110CA, LA NELAP - 02089, NY NELAP - 11291, TX NELAP - T104704434-11-3, UT NELAP -CA009332011-1, WA NELAP - C935
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/11 , Expiration date: 06/30/12.

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
Pacific Groundwater Group
Workorder# 1207065A

Six 1 Liter Summa Canister samples were received on July 05, 2012. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

Sample SG-30-2 was placed on hold per client request.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV and/or LCS.

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SG-10

Lab ID#: 1207065A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Toluene	3.3	5.1	12	19

Client Sample ID: SG-20

Lab ID#: 1207065A-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.73	4.1	2.3	13
Ethyl Benzene	0.73	1.3	3.2	5.6
Toluene	0.73	9.3	2.8	35
m,p-Xylene	0.73	2.3	3.2	9.9
o-Xylene	0.73	1.0	3.2	4.6

Client Sample ID: SG-22

Lab ID#: 1207065A-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.74	3.9	2.4	12
Ethyl Benzene	0.74	0.75	3.2	3.2
Toluene	0.74	3.3	2.8	12
m,p-Xylene	0.74	1.2	3.2	5.4

Client Sample ID: SG-30

Lab ID#: 1207065A-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.79	2.2	2.5	7.0
Toluene	0.79	2.1	3.0	7.8

Client Sample ID: SG-40

Lab ID#: 1207065A-06A

No Detections Were Found.



Air Toxics

Client Sample ID: SG-10

Lab ID#: 1207065A-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070624	Date of Collection:	7/3/12 10:04:00 AM
Dil. Factor:	6.56	Date of Analysis:	7/6/12 07:20 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	3.3	Not Detected	10	Not Detected
Ethyl Benzene	3.3	Not Detected	14	Not Detected
Toluene	3.3	5.1	12	19
m,p-Xylene	3.3	Not Detected	14	Not Detected
o-Xylene	3.3	Not Detected	14	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	88	70-130
Toluene-d8	93	70-130
4-Bromofluorobenzene	104	70-130



Air Toxics

Client Sample ID: SG-20

Lab ID#: 1207065A-02A

EPA METHOD TO-15 GC/MS FULL SCAN

DATA SHEET TO A - COMPLETION				
File Name:	3070625	Date of Collection: 7/3/12 10:48:00 AM		
Dil. Factor:	1.46	Date of Analysis: 7/6/12 07:56 PM		
Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.73	4.1	2.3	13
Ethyl Benzene	0.73	1.3	3.2	5.6
Toluene	0.73	9.3	2.8	35
m,p-Xylene	0.73	2.3	3.2	9.9
o-Xylene	0.73	1.0	3.2	4.6

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	78	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	107	70-130



Air Toxics

Client Sample ID: SG-22

Lab ID#: 1207065A-03A

EPA METHOD TO-15 GC/MS FULL SCAN

DATA SHEET FOR A COMPOUND SCREEN				
File Name:	3070626	Date of Collection: 7/3/12 11:00:00 AM		
Dil. Factor:	1.49	Date of Analysis: 7/6/12 08:24 PM		
Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.74	3.9	2.4	12
Ethyl Benzene	0.74	0.75	3.2	3.2
Toluene	0.74	3.3	2.8	12
m,p-Xylene	0.74	1.2	3.2	5.4
o-Xylene	0.74	Not Detected	3.2	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	77	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	111	70-130



Air Toxics

Client Sample ID: SG-30

Lab ID#: 1207065A-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070627	Date of Collection:	7/3/12 11:55:00 AM
Dil. Factor:	1.58	Date of Analysis:	7/6/12 08:51 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.79	2.2	2.5	7.0
Ethyl Benzene	0.79	Not Detected	3.4	Not Detected
Toluene	0.79	2.1	3.0	7.8
m,p-Xylene	0.79	Not Detected	3.4	Not Detected
o-Xylene	0.79	Not Detected	3.4	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	78	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	112	70-130



Air Toxics

Client Sample ID: SG-40

Lab ID#: 1207065A-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070629	Date of Collection:	7/3/12 12:55:00 PM
Dil. Factor:	1.61	Date of Analysis:	7/6/12 09:47 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.80	Not Detected	2.6	Not Detected
Ethyl Benzene	0.80	Not Detected	3.5	Not Detected
Toluene	0.80	Not Detected	3.0	Not Detected
m,p-Xylene	0.80	Not Detected	3.5	Not Detected
o-Xylene	0.80	Not Detected	3.5	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	74	70-130
Toluene-d8	94	70-130
4-Bromofluorobenzene	106	70-130



Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1207065A-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070606	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/6/12 11:06 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Benzene	0.50	Not Detected	1.6	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	75	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	104	70-130

Client Sample ID: CCV

Lab ID#: 1207065A-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070602	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/6/12 08:55 AM

Compound	%Recovery
Benzene	100
Ethyl Benzene	119
Toluene	101
m,p-Xylene	117
o-Xylene	118

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	76	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	109	70-130

Client Sample ID: LCS

Lab ID#: 1207065A-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070603	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/6/12 09:24 AM

Compound	%Recovery
Benzene	105
Ethyl Benzene	118
Toluene	101
m,p-Xylene	118
o-Xylene	116

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	77	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	107	70-130

Client Sample ID: LCSD

Lab ID#: 1207065A-09AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	3070604	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/6/12 09:41 AM

Compound	%Recovery
Benzene	105
Ethyl Benzene	120
Toluene	103
m,p-Xylene	125
o-Xylene	123

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	79	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	112	70-130



CHAIN-OF-CUSTODY RECORD

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX (916) 985-1020

Page of

Project Manager AT: Kelly Buchner; PG: Inger Jackson
Collected by: (Print and Sign) Inger Jackson
Company Pacific Groundwater Group Email inger@pgw.com
Address 2377 Eastlake Ave E City Seattle State WA Zip 98102
Phone 206 309 0144 Fax 206 309 6968

Project Info:
P.O. # J1001-04
Project # _____
Project Name Birds Eye
Turn Around Time: ☐ Normal ☒ Rush 5 Bus. Day
Lab Use Only
Pressurized by: _____ Date: _____
Pressurization Gas: N₂ He

Lab I.D.	Field Sample I.D. (Location)	Can #	Date of Collection	Time of Collection	Analyses Requested	Canister Pressure/Vacuum		
						Initial (in Hg)	Final	Receipt Final (ps)
01A	SG-10 (shipped separately)	30811	7/3/2012	1004	TD-15(SA)-STEX only ASTMD-1146 He & O ₂	-30	-5	
02A	SG-20	33718	7/3/2012	1048	Attached	-29	-5	
03A	SG-20	2062	7/3/2012	1100		-30	-5	
04A	SG-30	9283AT	7/3/2012	1155	Attached	-30	-4	
05A	SG-30-2	37732	7/3/2012	1223		-30	-5	
06A	SG-40	36374	7/3/2012	1255		-29 3/4	-5	
	Inger Jackson to consult with K. Buchner before analysis of SG-30 and SG-30-2							

Relinquished by: (signature) [Signature] Date/Time 7/3/2012 1551
Received by: (signature) [Signature] Date/Time 7/5/12 0955
Notes: Benzene RL < 32 µg/m³
Ethylbenzene RL < 10,000 µg/m³
Toluene RL < 42,000 µg/m³
Xylenes RL < 1,000 µg/m³
*See Attached.

Relinquished by: (signature) _____ Date/Time _____
Received by: (signature) _____ Date/Time _____
Relinquished by: (signature) _____ Date/Time _____
Received by: (signature) _____ Date/Time _____
Shipper Name UPS Air Bill # 654015147223 Temp (°C) NA Condition GOOD Custody Seals Intact? Yes No None Work Order # 1207065

Method: Modified ASTM D-1946 (Sh)-He & O2

1207065

Compound	Rpt.Limit(%)
Oxygen	0.10
Helium	0.050

Reporting limits cited do not take into account sample dilution due to canister pressurization.

A Eurofins Lancaster Laboratories Company

Eurofins Air Toxics, Inc.

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Folsom, CA 95630

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F : 916-985-1020
www.airtoxics.com

7/12/2012

Ms. Inger Jackson
Pacific Groundwater Group
2377 Eastlake Avenue East

Seattle WA 98102

Project Name: Birds Eye
Project #:
Workorder #: 1207065B

Dear Ms. Inger Jackson

The following report includes the data for the above referenced project for sample(s) received on 7/5/2012 at Air Toxics Ltd.

The data and associated QC analyzed by Modified ASTM D-1946 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Kelly Buettner
Project Manager

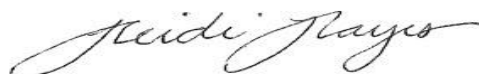
WORK ORDER #: 1207065B

Work Order Summary

CLIENT:	Ms. Inger Jackson Pacific Groundwater Group 2377 Eastlake Avenue East Seattle, WA 98102	BILL TO:	Ms. Inger Jackson Pacific Groundwater Group 2377 Eastlake Avenue East Seattle, WA 98102
PHONE:	206-329-0141x204	P.O. #	JI1001.04
FAX:		PROJECT #	Birds Eye
DATE RECEIVED:	07/05/2012	CONTACT:	Kelly Buettner
DATE COMPLETED:	07/12/2012		

<u>FRACTION #</u>	<u>NAME</u>	<u>TEST</u>	<u>RECEIPT VAC./PRES.</u>	<u>FINAL PRESSURE</u>
01A	SG-10	Modified ASTM D-1946	5.5 "Hg	5 psi
02A	SG-20	Modified ASTM D-1946	2.5 "Hg	5 psi
03A	SG-22	Modified ASTM D-1946	3.0 "Hg	5 psi
04A	SG-30	Modified ASTM D-1946	4.5 "Hg	5 psi
05A(on hold)	SG-30-2	Modified ASTM D-1946	5.5 "Hg	5 psi
06A	SG-40	Modified ASTM D-1946	5.0 "Hg	5 psi
07A	Lab Blank	Modified ASTM D-1946	NA	NA
07B	Lab Blank	Modified ASTM D-1946	NA	NA
08A	LCS	Modified ASTM D-1946	NA	NA
08AA	LCSD	Modified ASTM D-1946	NA	NA

CERTIFIED BY:



Technical Director

DATE: 07/12/12

Certification numbers: AZ Licensure AZ0719, CA NELAP - 02110CA, LA NELAP - 02089, NY NELAP - 11291, TX NELAP - T104704434-11-3, UT NELAP -CA009332011-1, WA NELAP - C935
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/11 , Expiration date: 06/30/12.

Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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LABORATORY NARRATIVE
Modified ASTM D-1946
Pacific Groundwater Group
Workorder# 1207065B

Six 1 Liter Summa Canister samples were received on July 05, 2012. The laboratory performed analysis via Modified ASTM Method D-1946 for fixed gases in air using GC/TCD. The method involves direct injection of 1.0 mL of sample.

On the analytical column employed for this analysis, Oxygen coelutes with Argon. The corresponding peak is quantitated as Oxygen.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

<i>Requirement</i>	<i>ASTM D-1946</i>	<i>ATL Modifications</i>
Calibration	A single point calibration is performed using a reference standard closely matching the composition of the unknown.	A 3-point calibration curve is performed. Quantitation is based on a daily calibration standard which may or may not resemble the composition of the associated samples.
Reference Standard	The composition of any reference standard must be known to within 0.01 mol % for any component.	The standards used by ATL are blended to a $\geq 95\%$ accuracy.
Sample Injection Volume	Components whose concentrations are in excess of 5 % should not be analyzed by using sample volumes greater than 0.5 mL.	The sample container is connected directly to a fixed volume sample loop of 1.0 mL on the GC. Linear range is defined by the calibration curve. Bags are loaded by vacuum.
Normalization	Normalize the mole percent values by multiplying each value by 100 and dividing by the sum of the original values. The sum of the original values should not differ from 100% by more than 1.0%.	Results are not normalized. The sum of the reported values can differ from 100% by as much as 15%, either due to analytical variability or an unusual sample matrix.
Precision	Precision requirements established at each concentration level.	Duplicates should agree within 25% RPD for detections $> 5 \times$ the RL.

Receiving Notes

Sample SG-30-2 was placed on hold per client request.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit.

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the detection limit.

M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Summary of Detected Compounds

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

Client Sample ID: SG-10

Lab ID#: 1207065B-01A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	1.5

Client Sample ID: SG-20

Lab ID#: 1207065B-02A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.19	17

Client Sample ID: SG-22

Lab ID#: 1207065B-03A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.19	15

Client Sample ID: SG-30

Lab ID#: 1207065B-04A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.22	13

Client Sample ID: SG-40

Lab ID#: 1207065B-06A

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.20	20

Client Sample ID: SG-10

Lab ID#: 1207065B-01A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9071113b	Date of Collection: 7/3/12 10:04:00 AM
Dil. Factor:	1.64	Date of Analysis: 7/11/12 01:37 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.16	1.5
Helium	0.082	Not Detected

Container Type: 1 Liter Summa Canister

Client Sample ID: SG-20

Lab ID#: 1207065B-02A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9071114b	Date of Collection: 7/3/12 10:48:00 AM
Dil. Factor:	1.93	Date of Analysis: 7/11/12 02:00 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.19	17
Helium	0.096	Not Detected

Container Type: 1 Liter Summa Canister

Client Sample ID: SG-22

Lab ID#: 1207065B-03A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9071115b	Date of Collection: 7/3/12 11:00:00 AM
Dil. Factor:	1.89	Date of Analysis: 7/11/12 02:21 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.19	15
Helium	0.094	Not Detected

Container Type: 1 Liter Summa Canister

Client Sample ID: SG-30

Lab ID#: 1207065B-04A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9071116b	Date of Collection: 7/3/12 11:55:00 AM
Dil. Factor:	2.15	Date of Analysis: 7/11/12 02:44 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.22	13
Helium	0.11	Not Detected

Container Type: 1 Liter Summa Canister

Client Sample ID: SG-40

Lab ID#: 1207065B-06A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9071117b
Dil. Factor: 2.04

Date of Collection: 7/3/12 12:55:00 PM
Date of Analysis: 7/11/12 03:08 PM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.20	20
Helium	0.10	Not Detected

Container Type: 1 Liter Summa Canister

Client Sample ID: Lab Blank

Lab ID#: 1207065B-07A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9071104b
Dil. Factor: 1.00

Date of Collection: NA
Date of Analysis: 7/11/12 09:32 AM

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.10	Not Detected

Container Type: NA - Not Applicable

Client Sample ID: Lab Blank

Lab ID#: 1207065B-07B

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9071103b
Dil. Factor: 1.00

Date of Collection: NA
Date of Analysis: 7/11/12 09:11 AM

Compound	Rpt. Limit (%)	Amount (%)
Helium	0.050	Not Detected

Container Type: NA - Not Applicable

Client Sample ID: LCS

Lab ID#: 1207065B-08A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name: 9071102b
Dil. Factor: 1.00

Date of Collection: NA
Date of Analysis: 7/11/12 08:46 AM

Compound	%Recovery
Oxygen	100
Helium	102

Container Type: NA - Not Applicable

Client Sample ID: LCSD

Lab ID#: 1207065B-08AA

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	9071118b	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 7/11/12 03:38 PM

Compound	%Recovery
Oxygen	100
Helium	102

Container Type: NA - Not Applicable

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