Mr. Keith Nowell
Alameda County Environmental Health
Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502-6577

Re: Former Exxon Station
5175 Broadway
Oakland, California
ACEH File No. 139
SFRWQCB Site No. 01-0958
UST Fund Claim No. 3406

Dear Mr. Nowell:

I, Mr. Ernie Nadel, have retained Pangea Environmental Services, Inc. (Pangea) as the environmental consultant for the project referenced above. Pangea is submitting the attached report on my behalf.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached report are true and correct to the best of my knowledge.

Sincerely,

Ernie Nadel
Rockridge Heights, LLC

August 6, 2012

VIA ALAMEDA COUNTY FTP SITE

Mr. Keith Nowell
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: **Revised Soil Gas Sampling Workplan - Addendum**
Former Exxon Station
5175 Broadway Street
Oakland, California
ACEH Fuel Leak Case No. RO0000139

Dear Mr. Nowell:

On behalf of Rockridge Heights, LLC, Pangea Environmental Services, Inc. has prepared this *Addendum* to the *Revised Soil Gas Sampling Workplan* dated July 16, 2012 for the subject site. This Addendum was prepared in response to our telephone conversation on August 3, 2012. During our discussion you indicated that soil gas data from the 5175 Broadway property proper would be very important for understanding site conditions with respect to completed remediation and future site use. Therefore, this Addendum proposes soil gas sampling from the site proper (5175 Broadway), augmenting the previously proposed soil gas sampling on adjacent properties only.

Pangea proposes to conduct soil gas sampling from six locations shown on attached revised Figure 2. The new sampling locations include two proposed subslab probes SS-6 and SS-7 within the existing concrete building slab, which effectively represents a foundation for future site use. The new sampling will also evaluate soil gas about 5 feet deep at the following four other locations across the site:

- SG-7 in the northeastern corner (near formerly impacted well MW-4A);
- SG-8 in the western central portion of the site (near formerly impacted wells MW-8A/8C);
- SG-9 in the central southern portion of site (between wells MW-3A and DPE-3); and
- SG-10 in the eastern portion of the site (where groundwater concentrations rebounded the most during recent groundwater monitoring of well DPE-2).

We have not proposed more southerly sampling locations since we have already proposed resampling of existing subslab probes SS-1 and SS-2 within the adjacent building at 5151 Broadway, and due to the very shallow bedrock in this portion of the site.

The soil gas sampling will be performed in general accordance with procedures described in the Workplan, in Pangea's Standard Operating Procedures (SOPs) for Soil Gas Sampling (Appendix A), and in the *FINAL Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* from California Environmental Protection Agency, Department of Toxic Substance Control dated October 2011. Pangea plans to install semi-permanent probes to facilitate periodic sampling as required to assess site conditions.

Following agency approval Pangea will expedite soil gas sampling and report preparation. If you have any questions or would like to meet at the site, please call me at (510) 435-8664.

Sincerely,
Pangea Environmental Services, Inc.

Bob Clark-Riddell, P.E.
Principal Engineer

cc: Rockridge Heights, LLC, C/O Ernie Nadel, 6100 Pinewood Road, Oakland, California 94611
SWRCB Geotracker (Electronic copy)

Attachments:

Figure 2 – Proposed Soil Gas Sampling Locations and Utility Map
Appendix A –Standard Operating Procedures for Soil Gas Sampling

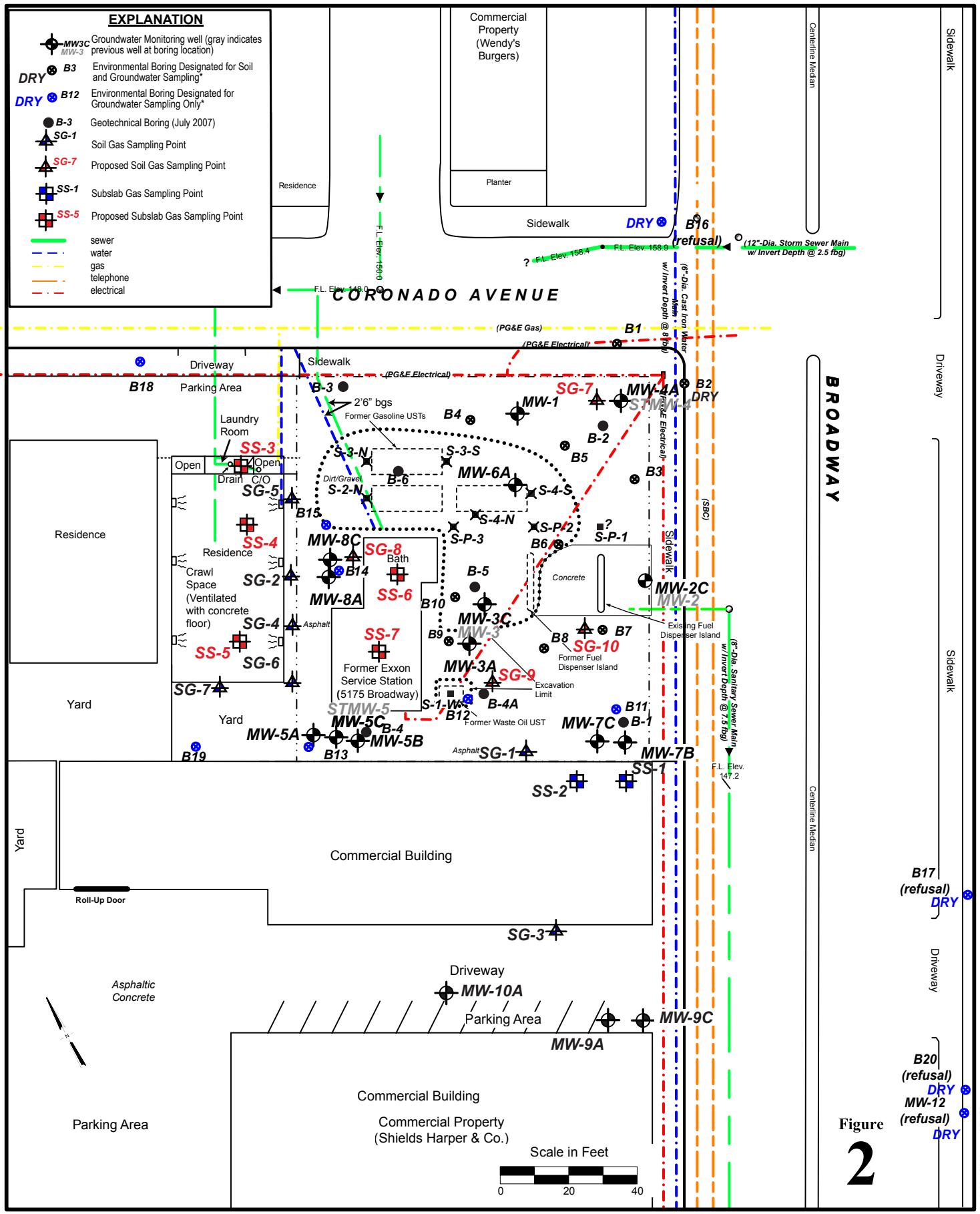

Figure 2

Former Exxon Station
5175 Broadway
Oakland, California

Proposed Soil Gas Sampling and Utility Map

PANGEA

APPENDIX A

Standard Operating Procedures

STANDARD OPERATING PROCEDURES FOR SOIL GAS SAMPLING

1.0 PURPOSE

This standard operating procedure (SOP) describes the procedures for collecting shallow soil gas vapor samples using temporary vapor probes and evacuated, stainless-steel Summa canisters. The SOP is modified from procedures and information presented in California Regional Water Quality Control Board – Los Angeles Region (LARWQCB), 1997, Cal/EPA 2004, and discussions (September 2006) with K Prime (Santa Rosa, California) laboratory staff.

2.0 REQUIRED EQUIPMENT

- Drill rig or hammer drill with 1" bit and smaller bits (slightly larger than vapor probe tip)
- Tubing for cleaning boring
- Vapor probes and tubing with Swagelok threaded compression fitting and vapor-tight cap.
- Rubber stopper or Teflon disk
- Powdered bentonite or expanding Portland cement
- 6-Liter Summa canister (evacuated with approximately 30" Hg vacuum) with vacuum gauge for purging and leak testing
- 6-Liter Summa canister with vacuum gauge for each sample (including duplicates)
- 1-Liter Summa canister for leak-check compound
- K Prime Inc. stainless-steel sampling manifold (see Figure 2) (request that laboratory leak-check manifold prior to mobilization)
- Leak-check compound (e.g. isopropyl alcohol) and absorbent material (e.g. gauze)
- Photoionization detector (PID)
- Isobutylene for PID calibration
- Tedlar bags for sampling leak-check compound
- Leak-check enclosure (plastic container with flexible weatherstripping and openings for vapor probe tubing and for sampling enclosure atmosphere)
- Record-keeping materials
- Latex or nitrile gloves

3.0 PROCEDURES

3.1 Boring Clearance

Prior to installing temporary soil vapor probes, ensure that a utility clearance has been conducted to ensure that subsurface utility and rebar locations have been identified and marked.

3.2 Vapor Probe Installation

1. To protect surfaces, lay plastic sheeting around the probe location.
2. Use a rotary hammer drill or concrete-coring equipment to create an approximately 1 ½ -inch or greater diameter hole that penetrates the slab.
3. In general, the drive rod is driven to a predetermined depth and then pulled back to expose the inlets of the soil gas probe either by exposing a short screened section or by leaving a disposable drop-off tip in the hole. After sample collection, both the drive rod and tubing are removed.

4. During installation of the probe, hydrated bentonite should be used to seal around the drive rod at ground surface to prevent ambient air intrusion from occurring.
5. The inner soil gas pathway from probe tip to the surface should be continuously sealed (e.g., a sampling tube attached to a screw adapter fitted with an o-ring and connected to the probe tip) to prevent infiltration.
6. Equilibration Time: During probe emplacement, subsurface conditions are disturbed. To allow for subsurface conditions to equilibrate, the following equilibration times are recommended:

   For probes installed with the direct push method where the drive rod remains in the ground, purge volume test, leak test, and soil gas sampling should not be conducted for at least 30 minutes following probe installation.

   For probes installed with the direct push method where the drive rod does not remain in the ground, purge volume test, leak test, and soil gas sampling should not be conducted for at least 48 hours following probe installation.

   For probes installed with hollow stem drilling methods, purge volume test, leak test, and soil gas sampling should not be conducted for at least 48 hours (depending on site lithologic or drilling conditions) after the soil gas probe installation.
7. Probe installation time should be recorded in the field log book.
8. Decontamination: After each use, drive rods and other reusable components should be properly decontaminated to prevent cross contamination. These methods include:

   3-stage wash and rinse (e.g., wash equipment with a non-phosphate detergent, rinse with tap water, and finally rinse with distilled water); and/or

   Steam-cleaning.

3.3 Vapor Sampling

During vapor sampling, record all valve open/close times and canister/manifold vacuum readings at each step.

Setup

1. Calculate and record the volume of the sampling assembly, tubing vapor probe, and any permeable annular space around the vapor probe tip.

   Volume =3.14 x (1/2*ID) x (1/2*ID) *L,

   where ID = tubing or manifold inside diameter and L = length of tubing/manifold segment.
2. Wear latex or nitrile gloves while handling sampling equipment. Change gloves whenever a new sample is collected and after handling leak-check compound.
3. Replace the vapor probe cap with a closed Swagelok valve. Connect the sampling manifold to the vapor probe, sample Summa canister and purge Summa canister using Swagelok fittings and stainless-steel, Teflon or Tygon tubing. Check all fittings for tightness (do not overtighten).
4. Close all valves. Record pre-test vacuum readings on both canisters.

Flow and Leak Check

1. Open both manifold valves and valve on purge Summa canister. Do *not* open valve on

sample port. Allow manifold/tubing vacuum to stabilize at approximately 30" Hg.

2. Close purge canister valve and wait at least 10 minutes. Monitor manifold vacuum gauge to test for leaks. If the vacuum decreases, rectify the leak before proceeding.

3. If vacuum is stable, open purge canister valve and open vapor probe valve. After approximately *5 seconds*, close the canister valve and estimate flow rate by recording the elapsed time after valve closure for manifold vacuum to drop to 5" vacuum, as indicated on the following chart (specific to K-Prime sampling manifold)

K PRIME, INC. SOIL GAS MANIFOLD FLOW RATE AND VACUUM LEVEL ESTIMATES

T (seconds)	PV	F (ml/minute)
5	0	135
10	5	115
15	10	90
30	15	60
120	20	40
480	25	20

Source: K Prime, Inc. – July 24, 2006

NOTES:
T = Time duration from full vacuum to less than 5" vacuum after closing purge canister.
PV = Approximate vapor probe vacuum level based on measured T
F = Approximate sampling flow rate based on measured T

4. This procedure should also be conducted several times at the beginning of sampling to ensure that flow rate is sufficient. If no significant flow is attained, either the sampling line is plugged or the vapor probe is positioned in an impermeable or saturated layer. Such a situation should be rectified before sample collection.

5. Place absorbent materials (e.g., gauze) *lightly* moistened (e.g., five drops) with leak-check compound (isopropyl alcohol) inside the leak-check enclosure. Do not allow liquid to come in direct contact with tubing or sampling assembly.

6. Place leak-check enclosure over vapor probe and seal to floor using weatherstripping or duct tape. Ensure that PID has been calibrated with isobutylene gas. Note that the isopropyl alcohol response factor is approximately 5.6 (i.e. a reading of 2 ppm on the PID indicates 5.6 x 2 = 11.2 ppm of isopropyl alcohol in the sample). Record both the observed PID reading and the calculated isopropyl alcohol concentration. If the PID reading is below 10 ppm, slowly reapply leak-check compound.

7. Record PID reading for leak-check enclosure at least once every 5 minutes during purging and sampling. Slowly reapply leak-check compound if PID reading drops more than 20% below initial readings in an attempt to return to the initial readings.

Purge and Sample

1. Open purge canister valve and vapor probe valve and purge the appropriate number of purge volumes. For vapor sampling in support of risk-assessments for regulatory review, a step-purge test should be conducted at a "worst case" sampling point, using 1, 3 and 7 purge volumes to determine the appropriate purge volume that yields the highest target compound concentration. For soil gas screening, or where a purge test is not feasible,

purge approximately 3 to 5 purge volumes of the tubing and sampling assembly. Do *not* over-purge. Include the purging conducted during the leak-check step above in the purge volume.

2. Close purge canister valve and open sample canister valve. Sampling should take approximately 30 minutes for a 6-liter Summa canister.
3. Sampling volume for a 6-liter canister can be estimated based on the following table.

Relationship between Final Canister Vacuum and Volume Sampled

Final Vacuum ("Hg)	0	2.5	5	7.5	10	12.5	15	17.5	20
Volume Sampled (L)	6	5.5	5	4.5	4	3.5	3	2.5	2

Source: Air Toxics, Inc.

4. Close sampling canister valve when vacuum decreases to between 1" and 5" mercury. Do *not* allow vacuum to fall below this range.
5. Use a 1-liter Summa canister to collect a sample from the leak-check enclosure. Submit canister for analysis of leak-check compound only.
6. Disassemble sampling assembly, and cap (or remove and restore) vapor sampling point.
7. Fill out chain-of-custody form, including analysis for chemicals of concern and leak-check compound. Also analyze for oxygen, carbon dioxide and methane. Include final vacuum reading and serial numbers of canister and flow restrictor.
8. Collect at least one duplicate sample per site per sampling event from the sampling point with the anticipated highest vapor concentrations. The duplicate sample should be attached to the manifold prior to equipment vacuum testing so its connections can be tested. Collect a sample without further purging, using the same sampling procedures used for the original sample.

Decontamination and Decommissioning

9. Use separate sampling manifold and tubing for each sample location. Return equipment to laboratory for decontamination.
10. Backfill soil vapor probe holes with bentonite slurry.

REFERENCES

California Regional Water Quality Control Board – Los Angeles Region (LARWQCB), 1997, Interim guidance for active soil gas investigation, February 25.

Cal/EPA, 2003, Advisory – Active soil gas investigations, California Environmental Protection Agency, Department of Toxic Substances Control, January 28.

Cal/EPA, 2004, Interim final guidance for the evaluation and mitigation of subsurface vapor intrusion to indoor air, California Environmental Protection Agency, Department of Toxic Substances Control, December 15 (revised February 7, 2005).

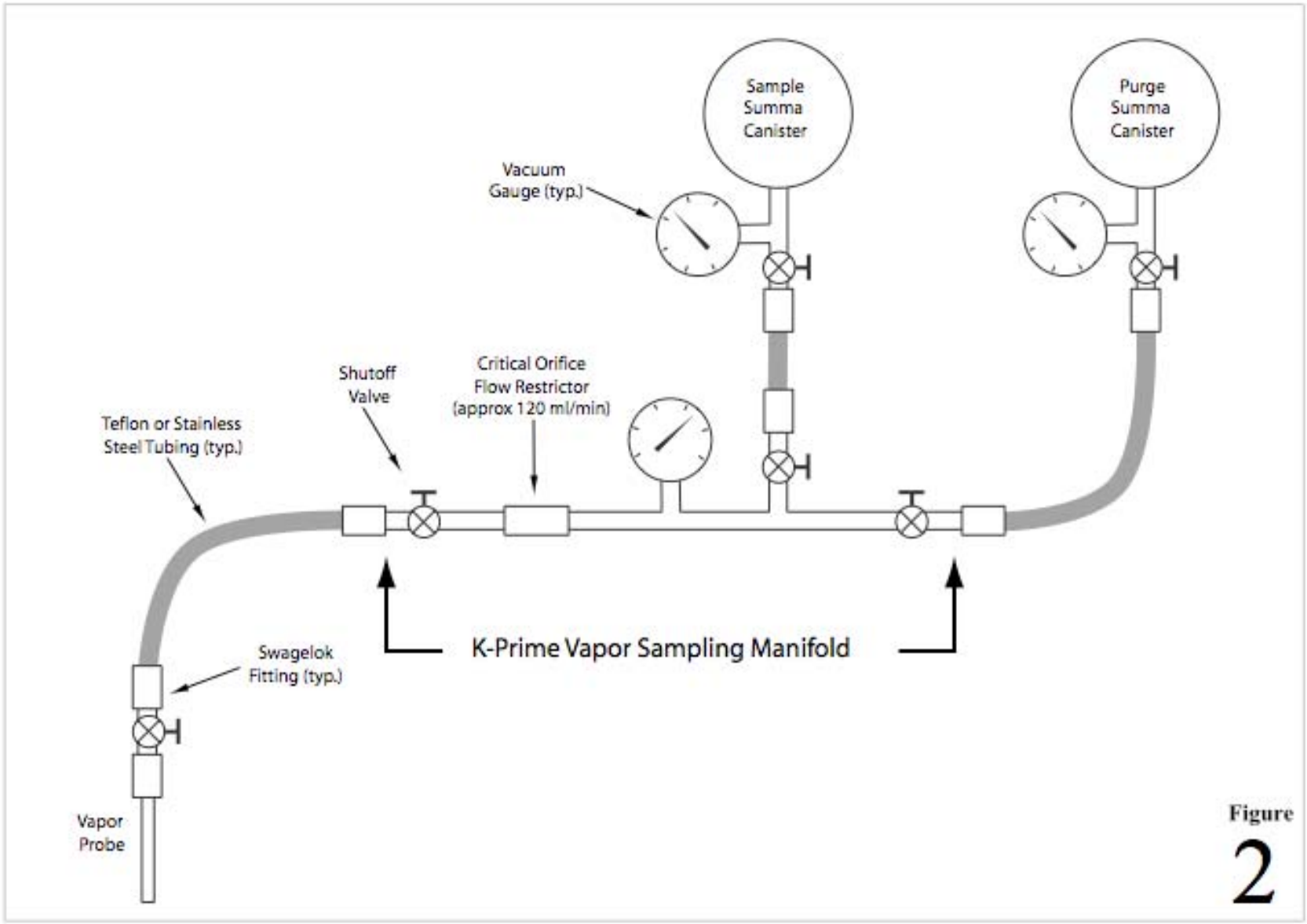

Figure
2

Subslab and Soil Vapor Sampling Manifold Schematic

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