Quality Assurance Project Plan (QAPP)
1102 South Main Street Moscow, Idaho Phase II Environmental Site Assessment – Addendum II

Prepared for:

City of Moscow

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Moscow, ID 83843

Prepared by:

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Title and Approval Sheet

Quality Assurance Project Plan Addendum II for 1102 South Main Street Moscow

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Effective Date: August 23, 2013

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
EDB	ethylene-dibromide
EDC	ethylene-dichloride
ESA	Environmental Site Assessment
IDAPA	Idaho Department of Administrative Procedures Act
L	liter
mL/min	milliliters per minute
MTBE	methyl tert-butyl ether
PID	Photo-Ionization Detector
QAPP	Quality Assurance Project Plan
RSL	Regional Screening Level
SIM	selective ion monitoring
TerraGraphics	TerraGraphics Environmental Engineering, Inc.
$\mu g/m^3$	microgram per cubic meter
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

Section 1.0 Introduction

Based on results from the Phase II Environmental Site Assessment (ESA) conducted at 1102 S. Main Street in Moscow, Idaho, TerraGraphics Environmental Engineering, Inc. (TerraGraphics) recommended additional site assessment activities, which include the following: conducting soil vapor sampling and passive diffusive ambient air sampling. The purpose of this Quality Assurance Project Plan (QAPP) addendum is to update the original QAPP (TerraGraphics and STRATA, 2012) for the additional sampling activities and to comply with the U.S. Environmental Protection Agency's (USEPA) requirements for QAPPs (USEPA, 2001). This work is being conducted as part of the City of Moscow Brownfields Coalition Assessment Project. The goal is to characterize the extent of the petroleum contamination in the soil and groundwater and to evaluate vapor intrusion.

This addendum includes revisions to specific sections of the original QAPP as detailed below. All other sections in the original QAPP have remained unchanged because either the content or purpose is still applicable to these additional site assessment activities.

Section 2.0 Vapor Sampling

2.1 Soil Vapor Wells

TerraGraphics will install one soil vapor well near the southeast corner of the former tank basin. Figure 1 shows the proposed location. The vapor point installed in the vapor well will collect information on potential Volatile Organic Compound (VOC) concentrations in soil vapors. Vapor concentrations will be compared to Idaho's Deep Soil Vapor screening levels found in Table 2 of the Risk Evaluation Manual for Petroleum Releases (Petro REM) Screening Levels (IDEQ, 2012), which are derived from the USEPA *Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites* (USEPA, 2013) by applying an attenuation factor of 0.01 $\mu g/m^3$ to Residential Air. These screening levels are summarized in Table 1. The vapor well will be constructed using a direct push drill rig or a hand auger depending on accessibility. The drill rig rod equipped with an anchor point will be driven to the target depth of the borehole (3–5 feet below ground surface [bgs]). Once the targeted depth is achieved, the rod will be removed, leaving the anchor point and attached Teflon® tubing. The well borehole will be backfilled with silica sand and sealed with bentonite chips. An implant funnel with a capped end and sampling tube will be installed.

Soil gas samples will be collected per ASTM D-5314-92, *Standard Guide for Soil Gas Monitoring in the Vadose Zone* (ASTM, 2006). The soil vapor will be screened in the field for VOCs using a photoionization detector (PID). Two soil vapor samples will be collected (including one duplicate) from the soil vapor well utilizing 1-L summa canisters connected through Swagelok® fittings to a 200 milliliters (mL) air flow-controller. Table 2 provides recommended container types and holding times.

Table 1. Techniques, Method Number, and Reporting Limits for Site Analyses Compared to Petro REM Soil Vapor Screening Levels and USEPA RSLs

Analyte	Method	Reporting Limit	Deep Soil Vapor[1]	
			Unrestricted Use	Commercial / Industrial
Vapor (soil vapor monitoring well) (µg/m^3)				
Benzene	TO-15	0.32	31	160
Toluene		0.38	520,000	2,200,000
Ethylbenzene		0.43	97	490
Total Xylenes		0.43	10,000	44,000
EDC		0.40	9	47
MTBE		0.36	940	4,700
Naphthalene		5	7	36
Analyte	**Method**	**Reporting Limit**	**RSL[2]**	
			Residential	**Industrial**
Indoor Passive Diffusive Ambient Air (µg/m^3)				
Benzene	TO-15 SIM	0.05	0.31	1.6
Toluene		0.01	5,200	22,000
Ethylbenzene		0.01	0.97	4.9
m,p-xylene		0.01	100	440
o-xylene		0.01	100	440
EDC		0.081	0.094	0.47
MTBE		0.36	9.4	47
Naphthalene		0.05	0.072	0.36

Notes:
1. Screening level values for deep soil vapor are equivalent to USEPA RSLs (2013) for residential and industrial ambient air divided by an attenuation factor of 0.01 µg/m^3.
2. Screening level values for USEPA RSLs (2013).
Petro REM = Risk Evaluation Manual for Petroleum Releases (IDEQ, 2012)

Table 2. Recommended Container Types, Number of Containers, Preservation, and Holding Times for Samples

Source	Analytes (USEPA Method)	Number of Containers[1]	Sample Size/ Container	Preservation	Analysis Holding Time
Soil Vapor	VOCs (TO-15)[2]	2	Summa Canisters	none	14 Days
Ambient Air	VOCs (TO-15 SIM and TO-15-LL + Naph)[3]	3	*radiello*® 130 cartridge	Cool to 4°C	60 Days

Notes:
1. Number of containers includes 1 field duplicate for the soil vapor and 1 field blank for the ambient air.
2. VOCs – Volatile organic compounds including benzene, toluene, ethylbenzene, total xylenes, methyl tert-butyl ether, and ethylene-dichloride; USEPA Method TO-15 SIM (USEPA, 1999)
3. Low level and naphthalene – VOCs and naphthalene; USEPA Method TO-15 LL + Naph (USEPA, 1999)

The summa canisters will be sent to Eurofins Air Toxics, Ltd. in Folsom, California, where they will be analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), and ethylene-dichloride (EDC), and naphthalene using USEPA Method TO-15 (USEPA, 1999) (Table 1).

2.2 Passive Diffusive Ambient Air Sampling

Two passive diffusive ambient air samples will be collected from the interior of the onsite building. A *radiello*® 130 cartridge will be used to collect information about potential VOC concentrations in ambient air. Sample results are compared to the Petro REM Screening Levels, which are derived by applying an attenuation factor of 0.1 µg/m^3 to the RSLs (USEPA, 2013) (Table 1).

The radiello cartridges will be sent to Eurofins Air Toxics, Ltd. in Folsom, California, where they will be analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tert-butyl ether (MTBE), and ethylene-dichloride (EDC) using USEPA Method TO-15 selective ion monitoring (SIM) and naphthalene by TO-15-LL + naph [low level plus naphthalene] (USEPA, 1999) (Table 1).

2.2.1 Monitor Placement Considerations

Spatial Considerations: The passive monitor will be placed in an open and unobstructed position where typical air circulation will be adequate. The monitor will be placed at least 20 centimeters below the ceiling (but not near lighting or air vents), 50 centimeters above the floor, and 15 centimeters from a wall. Locations near outside walls will be avoided, if possible. The passive monitor will be located where air circulation will provide at least the required minimum air velocity required for diffusion.

Indoor Atmospheric Conditions: The monitor will be placed in a central location that is both unobstructed and representative of the actual used area of the room. The location will not interfere with normal occupant activities. The following will also be considered when installing the monitor in the field:

1. Humidity: Locations near water basins, tubs, showers, stoves, washers, driers, humidifiers/dehumidifiers, or other known sources/sinks of humidity will be avoided.
2. Temperature: Locations near furnaces, vents, sinks, tubs, showers, electric lights, air conditioners, or other devices that may directly or indirectly generate heat/cold will be avoided.
3. Meteorologic: Locations in direct sunlight or near seasonal or short-term variations from weather will be avoided, for example, near windows, drafty openings, and intake/exhaust vents.
4. Airflow: Locations in direct airflow, such as near HVAC vents, appliance fan vents, and computer cooling fans, will be avoided. Areas with a known air-flow due to pressure differentials between rooms will be avoided. Air with insufficient circulation to provide a representative atmosphere to the monitor will be avoided.

2.2.2 Sampler Assemblage and Deployment

Passive diffusive ambient air samples will be collected per the *radiello*® Manual, Supelco Edition (Sigma-Aldrich Co., 2006) and per ASTM D-6306-10, *Standard Guide for Placement and Use of Diffusion Controlled Passive Monitors for Gaseous Pollutants in Indoor Air* (ASTM, 2010). The ambient air samples will be collected in *radiello*® code 130 cartridges with a sampling time of 7 days. The essential parts of *radiello*® are 1) the adsorbing cartridge, 2) the diffusive body, and 3) the supporting plate with the bar code indication.

The sampling period begins when the lid, cover, or protective container of the monitor is removed to permit sampling by the monitor. The sampling crew will follow the *radiello*® assembly procedures provided below:

1. Open the plastic bag, draw the adsorbent cartridge out from the tube and put it in the diffusive body. The lower part of the diffusive body holds a seat for the central positioning of the cartridge. The cartridge will be inserted fully into the diffusive body. The sampler will be careful to not touch the cartridge with their fingers if possible. The sampler will keep the glass or the plastic tube and stopper in the original plastic bag.
2. The sampler will keep the diffusive body in a vertical position, screw it onto the supporting plate.
3. The sampler will keep note of the start date and time and insert the barcode label in the pocket without peeling it off.
4. The sampler will place the assembled device in the monitoring location. The monitor will collect the sample over 7 days.

The sampling period is terminated when the monitor is sealed and removed from the sampling environment. The sampling crew will follow the *radiello*® steps for collection provided below:

1. The sampler will keep note of the date and time of the end of exposure (see subsection 2.2.3 Documentation Records for more information). Place the cartridge into the tube, peel off the label and stick it onto the tube such that the barcode is parallel to the axis of the tube; any other position will compromise the barcode automated reading by the optic reading device.

2. The cartridges will be sent to Air Toxics where they will be analyzed for BTEX, MTBE, and EDC using USEPA Method TO-15 SIM and naphthalene by TO-15-LL + naph [low level plus naphthalene] (USEPA, 1999). The analytes will be desorbed from the *radiello*® tube using carbon disulfide (CS_2) solvent desorption.

2.2.3 Field Quality Assurance Samples

Quality control samples will include one blind duplicate soil gas sample. The blind duplicate soil gas sample will be collected at the one and only soil gas sampling location. Using two Summa canisters and flow controllers connected in parallel with a Swagelok –type, stainless steel tee fitting, a duplicate sample will be collected.

A field blank will be included for the passive diffusive ambient air sampling. The field blank cartridge will travel to the field site with the samples for deployment and retrieval. The cartridge will be uncapped for a period of approximately five minutes, during one of the deployments. While the sampling cartridges are exposed the field blank will be stored in a sampling freezer.

2.2.4 Documentation Records

Crews will not use marker pens to write on the label: markers contain solvents that are sampled by *radiello*®. The starting time of the sampling period will be transcribed to a logbook or appropriate form and on the monitor label. The temperature and humidity will be recorded based on the temperature and humidity strips provided with the sampling unit package. The logbook will also include the following information:

1. Description of the monitor location - The location of placement for a passive monitor will be documented with photographs and an onsite sketch.
2. Building/deployment area information – The sampler will note the building construction, type of heating system, insulation, occupancy number and patterns, and major appliance location.
3. Room location – The sampler will list the activities, general location of furnishings, possible sinks/sources, vents, and other relevant features. The notes will include a diagram of the sampling location and building, depicting the information listed in this subsection.

2.3 Laboratory

Samples will be shipped to Air Toxics Ltd. for analysis. Correspondence from the laboratory will go directly to Robin Nimmer, TerraGraphics Project Manager. The laboratory contact is:

Kyle Vagadori, Project Manager

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Section 3.0 Project Timetable

- QAPP Addendum preparation and approval: August 2013
- Coordination with Analytical Laboratory: August 2013
- Site utility locates: August 2013
- Field work: September 2013
- Laboratory Analysis: September 2013
- Data Review: September/October 2013
- Report Preparation: September/October 2013
- Issue Draft Report: September/October 2013
- Report Finalization: October/November 2013

Section 4.0 References and Resources Used

ASTM International (formally known as the American Society for Testing and Materials (ASTM). 2005. D-6282-98, Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations.

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U.S. Environmental Protection Agency (USEPA), 1999. Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition (EPA/625/R-96/010b), January 1999.

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Project No. 12003	TerraGraphics Environmental Engineering, Inc.	**City of Moscow Brownfields: 1102 S. Main St**	Date: 8/2/13
Scale: N.T.S.			
Requestor: REN		**Figure 1. Vapor Well Location**	
Drafter: REN			