Quality Assurance Project Plan
317 West 6th Street Moscow, Idaho Phase II Environmental Site Assessment

Prepared for:

City of Moscow

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Moscow, Idaho 83843

Prepared by:

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Title and Approval Sheet

Quality Assurance Project Plan for
317 West 6th Street Moscow, Idaho Phase II Environmental Site Assessment

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Effective Date: February 2012

Approved by:

Date: 3/20/2012

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Acronyms and Abbreviations

ABCA	Analysis of Brownfields Cleanup Alternatives
ACM	Asbestos-Containing Material
Anatek	Anatek Labs, Inc.
ASTM	American Society for Testing and Materials
bgs	below ground surface
CFR	Code of Federal Regulations
The City	City of Moscow
COC	Constituent of Concern
DQO	Data Quality Objective
EDB	Ethylene Dibromide
EDC	Ethylene Dichloride
ESA	Environmental Site Assessment
IDEQ	Idaho Department of Environmental Quality
IDTL	Initial Default Target Level
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MTBE	Methyl Tert-Butyl Ether
NPDWS	National Primary Drinking Water Standard
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCS	Petroleum-Contaminated Soil
PID	Photo Ionization Detector
PQL	Practical Quantitation Limit
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RATL	Remedial Action Target Level
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
REM	Risk Evaluation Manual
RPD	Relative Percent Difference
RSL	Regional Screening Level
RUSL	Residential Use Screening Level
SOP	Standard Operating Procedure
STRATA	Strata, A Professional Services Corporation, Inc.

SVOC	Semi-Volatile Organic Compound
TerraGraphics	TerraGraphics Environmental Engineering, Inc.
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

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Section 1.0 Project Management

This sampling effort is being conducted as part of the City of Moscow Brownfields Assessment Project under the *Master Quality Assurance Project Plan for the City of Moscow Brownfields Phase II Environmental Site Assessments*, *Moscow, Idaho* dated October 31, 2011 (TerraGraphics, 2011). The objective of this Quality Assurance Project Plan (QAPP) is to guide quality assurance and quality control (QA/QC) procedures for completion of a limited Phase II Environmental Site Assessment (ESA) for the site located at 317 West 6th Street in Moscow, Idaho. This QAPP is intended to ensure that sampling activities comply with the U.S. Environmental Protection Agency's (USEPA) requirements for QAPPs (USEPA, 2001). The primary goals will be to characterize potential soil, groundwater, or air contamination, and to potentially provide data for use in the Idaho Department of Environmental Quality's (IDEQ) Risk Evaluation Manual (REM) in order to determine potential hazards and/or risks associated with found contamination. The following sections list the key project personnel and their responsibilities, explain the problem(s) and site history, project schedules, data quality objectives, sampling, oversight, and data validation and use.

1.1 Project/Task Organization

This QAPP provides sampling strategies intended to evaluate the recognized environmental conditions (RECs) identified for the 317 West 6th Street site in a Phase I ESA prepared by Strata, A Professional Services Corporation, Inc. (STRATA) for the City of Moscow, entitled *Phase I ESA 217 West 6th Street Moscow, Idaho* and dated July 29, 2010 (STRATA, 2010). The site is known as 217 and 317 West 6th Street but will henceforth be referred to as 317 West 6th Street.

This section presents the project organization and the roles and responsibilities of the project team members. The project team member roles are identified in the organizational chart presented in Figure 1. Figure 2 identifies the City of Moscow, IDEQ, and USEPA personnel with management oversight and the two City of Moscow consultants who will be performing the site-specific Phase II ESAs during 2012.

Figure 1. Organization Chart

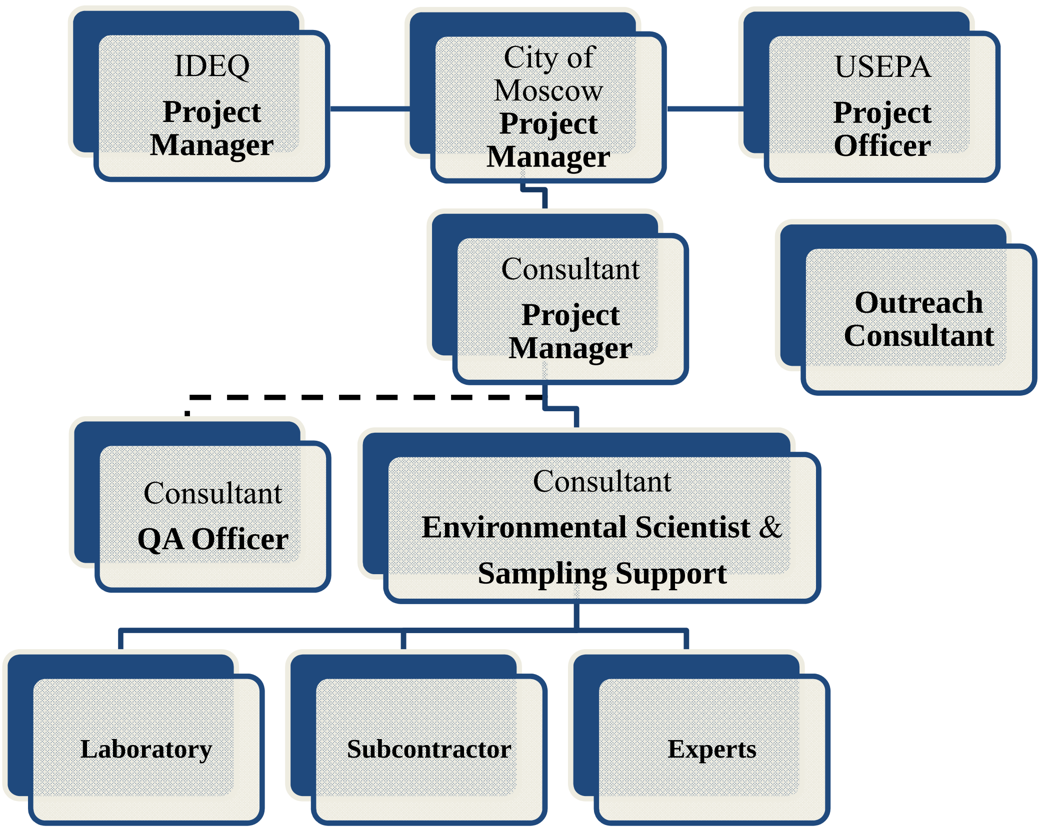


Figure 2. Key Project Personnel and Responsibilities

Name	Title/Responsibility
Jeffrey B. Jones City of Moscow 206 East 3rd Street Moscow, ID 83843 (208) 883-7007	Project Manager: Economic Development Specialist
Steve Gill IDEQ Coeur d'Alene Regional Office 2110 Ironwood Parkway Coeur d'Alene ID 83814 (208) 666-4632; (208) 818-5326 (cell)	Coeur d'Alene Regional Office Brownfields Program Specialist
Aaron Scheff IDEQ, Main Office 1410 North Hilton Street Boise, Idaho 83706 (208) 373-0420	IDEQ State Brownfields Program Manager
Robin Nimmer TerraGraphics 121 South Jackson Street Moscow, Idaho 83843 (208) 882-7858	TerraGraphics Project Manager, reports to IDEQ Program Specialist and TerraGraphics Program Manager, Jon Munkers
Shawn Ringo STRATA 1428 South Main Street Moscow, Idaho 83843 (208) 882-1006	STRATA Project Manager, reports to TerraGraphics Project Manager, Robin Nimmer
Jon Munkers TerraGraphics 3501 West Elder Street, Suite 301 Boise, ID 83705 (208) 336-7080	TerraGraphics Program Manager
Rachel Gibeault TerraGraphics 3501 West Elder Street, Suite 301 Boise, ID 83705 (208) 336-7080	TerraGraphics Quality Assurance/Quality Control (QA/QC) Officer, reports to TerraGraphics Project Manager, Robin Nimmer
John Coddington Anatek Labs 1282 Alturas Drive Moscow, ID 83843 (208) 882-2839	Project Analytical Laboratory, reports to TerraGraphics Project Manager, Robin Nimmer, and STRATA Project Manager, Shawn Ringo
Terri Griffith U.S. Environmental Protection Agency 1200 Sixth Avenue, Suite 900, ECL-112 Seattle, WA 98101	USEPA Brownfields Project Officer

1.2 Problem Definition/Background

The City of Moscow was awarded a USEPA Brownfields Assessment Coalition Grant (for hazardous substances contamination and petroleum contamination) in August of 2010. The City of Moscow is part of the Greater Moscow Area Coalition, which also includes the Moscow Urban Renewal Agency and Latah County.

The City is using the USEPA grant funds to conduct Phase I and II ESAs, as well as Analysis of Brownfields Cleanup Alternatives (ABCAs) for multiple Brownfield properties along a former railroad/industrial corridor, future industrial park property, and other negatively impacted and/or stigmatized areas.

The City of Moscow identified the site located at 317 West 6th Street as a Brownfield site within the former railroad corridor and the City's Urban Renewal District. Prior to purchasing the site, the City contracted STRATA to perform a Phase I ESA; the report was provided to the City on July 29, 2010 (STRATA, 2010). The Phase I ESA identified the site's historical use for the bulk storage of agricultural chemicals (fertilizer) as a REC for the site. It also identified a small heating oil underground storage tank (UST) on-site. Specifically, the Phase I ESA, based upon limited site soil and groundwater sampling, identified metals contamination in site soil and groundwater, pesticide contamination in site soil, and nutrients (nitrogen) contamination in site groundwater.

This QAPP supports assessing the identified site RECs and collecting data for use in IDEQ's REM to evaluate potential hazards and/or risks associated with found contamination. This QAPP also supports UST closure confirmation sampling; the small site UST will be removed to facilitate UST basin evaluation. This QAPP was prepared to address QA/QC measures associated with the site soil and groundwater sampling activities. This QAPP may be amended as the project progresses and future tasks are defined and authorized.

1.3 Project/Task Description

Sampling activities at the property will be conducted to evaluate the environmental condition of the site in order to determine potential hazards and/or risks to human health and the environment. A UST will be removed as part of the assessment activities.

1.3.1 Description of the Project Area

The site is located in the City of Moscow Legacy Crossing Urban Renewal District at 317 West 6th Street on the southwest corner of 6th and Jackson Streets. The Legacy Crossing Urban Renewal District is located between Moscow's historic downtown and the University of Idaho campus. Historically, the site and surrounding southern and western adjacent properties were/are occupied by industrial agricultural businesses supported by the former railroad corridor; a former railroad spur line bisects the western and eastern site. Otto's Produce was a retail shop in the 2000's that existed for less than 10 years. The building has since been torn down. The small remaining structure on the east side of the property has been vacant for a few years. Figure 3 provides a site location map.

1.3.2 Description of the Site-Specific Assessment Activities

All activities will be in compliance with the site-specific health and safety plan, included in Appendix A. Samples will be collected in accordance with the soil and groundwater sampling methodologies described in Section 2.2. Sample handling procedures will follow the guidelines described in Section 2.3. The samples collected will be submitted to Anatek Labs, Inc. (Anatek) in Moscow, Idaho for analysis.

Sample container types, preservation techniques, and holding times for the chemical analyses are presented in Table 1. Details for collecting QA/QC samples are described in Section 2.5.

1.3.2.1 Soil Sampling

Soil sampling will consist of seven surface soil multi-increment samples (including one QC sample), seven samples from soil borings, and six samples from near the excavated UST (including one QC sample). A total of 20 soil samples will be submitted to the laboratory for analysis.

Surface soil samples will be collected to evaluate metals and pesticide/herbicide impacts to site surface soil. The site will be divided into three decision units as follows, based upon site use history and/or prominent site features (see Figure 3):

- Eastern site office area and parking
- Central site bulk agricultural chemical storage area and railroad spur
- Western site warehouse and staging area

Six, 20-point multi-increment samples will be collected from locations randomly assigned to a grid superimposed upon each decision unit for confirmation sampling of the extended Phase I sampling results. An additional QC sample will also be collected for a total of seven samples. Samples will be collected from the top 6 inches of soil. Multi-increment samples will be analyzed for herbicides by USEPA method 8151A, organochlorine pesticides by USEPA method 8081B, organophosphorous pesticides by USEPA method 8270C and for Resource Conservation Recovery Act (RCRA)-8 metals by EPA method 6020A/7471A. Analytical results will be compared to IDEQ REM Initial Default Target Limits (IDTLs) and will be used to evaluate the surface soil exposure pathway in IDEQ's REM.

The site heating oil UST will be removed to evaluate potential petroleum contamination in the UST basin. Petroleum-contaminated soil (PCS), if encountered, will be over-excavated from the UST basin based upon visual evidence of contamination and photo ionization detector (PID) screening. Up to five confirmation soil samples will be collected from the longitudinal extremes of the UST basin/PCS excavation bottom to evaluate remaining soil petroleum concentrations, and an additional QC sample will be collected for a total of six samples. Confirmation soil samples will be analyzed for the IDTL analyte list for petroleum-contaminated sites minus the RCRA-8 metals because the tank contained heating oil and not gasoline. Samples will be assessed for the analytes benzene, toluene, ethylbenzene, xylenes, methyl-tert-butyl-ether (MTBE), ethylene-dibromide (EDB), and ethylene-dichloride (EDC) by USEPA method 8260B, and for polycyclic aromatic hydrocarbons (PAHs) by USEPA method 8270C. Soil sample results will be compared to IDEQ Residential Use Screening Levels (RUSLs).

Four borings will be advanced on-site using a direct push drill rig to a depth of approximately 15 feet below ground surface (bgs) per American Society for Testing and Materials (ASTM) D 6282-98, *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations* (ATSM, 2005). Up to seven soil samples will be collected. Proposed boring locations are depicted on Figure 3. Three of the seven soil samples will be collected from above the soil-water interface from two specific areas: 1) one sample from the former bulk agricultural chemical storage soil boring, and 2) two samples from the two down-gradient soil borings, to assist in evaluating the soil leaching to groundwater pathway in IDEQ's REM. Samples will be analyzed for the potential constituents of concern (COCs) identified in the Phase I ESA as RECs;

these include herbicides, organochlorine pesticides, organophosphorous pesticides, and RCRA-8 metals using the methods described above. If, during excavation of the UST, the soil appears to be contaminated and contamination is thought to have migrated, the soil boring samples may also be analyzed for petroleum constituents. Soil sample results will be compared to IDEQ REM IDTLs.

1.3.2.2 Groundwater Sampling

Four 2-inch diameter groundwater monitoring wells will be installed to a depth of approximately 15 feet bgs and placed at the same locations as the soil borings. The four proposed monitoring well locations are depicted on Figure 3. The well screen will be constructed of 0.01-inch machine slot screen PVC; the length will be determined in the field. Blank PVC riser will be threaded to the well screen and will extend up into flush surface-mounted monuments. The screened borehole section will be backfilled with Colorado silica sand and the riser portion backfilled with bentonite chips. Monitoring wells will be surveyed referencing a site horizontal and vertical datum so the measured depths to static groundwater may be used to establish a site groundwater gradient.

Groundwater samples will be collected from each of the four monitoring wells using TerraGraphics' *Standard Protocol for Ground Water Sampling* (TerraGraphics, 2006). One duplicate groundwater sample will be collected for QA/QC purposes, for a total of five groundwater samples. Groundwater samples will be analyzed for herbicides by USEPA method 8151A; organochlorine pesticides by USEPA method 8081B; organophosphorous pesticides by USEPA method 8270C; RCRA-8 metals by USEPA method 6020A/7471A, and for nitrate/nitrite, ammonia, total phosphorus, and total Kjehldahl nitrogen by methods SM 4500. Samples will not be analyzed for petroleum analytes in the Idaho IDTL list based on preliminary data found during the extended Phase I unless field data suggest it is warranted (e.g., shallow groundwater encountered in the UST excavation). Groundwater analytical data will be compared to IDEQ IDTLs or input into the REM to establish site Remedial Action Target Levels (RATLs).

1.3.3 Report Preparation

TerraGraphics will prepare a report documenting site soil and groundwater sampling field activities and analytical findings. Analytical test results will be compared to IDEQ IDTLs and/or RUSLs. Analyte concentrations detected above reporting limits will be used in the IDEQ REM to evaluate site surface soil, groundwater, and vapor exposure pathways. The report will include the purpose, scope, methods, and findings of the sampling, screening level/target level comparisons, risk assessment, figures, findings, conclusions, and recommendations for necessary additional investigation, if any. TerraGraphics will submit an electronic draft report to the City. After receipt and discussion of comments, TerraGraphics will incorporate comments, finalize, and submit to the City an electronic version of the final report and figures in Adobe Acrobat format.

Key

Monitoring Well and Soil Boring

Project No. 12002	TerraGraphics Environmental Engineering, Inc.	**City of Moscow Brownfields: 317 W. 6th Street**	Date: 1/26/12
Scale: N.T.S.			
Requestor: REN		**Figure 3. Proposed Sample Locations**	
Drafter: REN			

Table 1. Recommended Bottle Type, Number of Bottles, Preservation, and Holding Times for Samples

Source	Analytes (USEPA Method)	Number of Bottles[1]			Sample Size/ Container	Preservation	Analysis Holding Time
		SS[2]	UST[3]	Borings[4]			
Soil	RCRA-8 Metals (200.8[5]/6020A[6]/7471A[7])	7	0	7	8-ounce amber wide mouth jar with Teflon® lid	Cool to 4°C	6 months/28 days (Hg)
	ID IDTL VOCs (8260B)[8]	0	6	0 [7]	40-mL amber VOA vial	Methanol Cool to 4°C	14 days
	PAHs (8270C)[9]	0	6	0 [7]	4-ounce clear glass jar with Teflon® lid	Cool to 4°C	14 days
	Pesticides (8081B[10]/8270C) Herbicides (8151A[11])	7	0	7	4-ounce clear glass jar with Teflon® lid	Cool to 4°C	14 days
Groundwater	RCRA-8 Metals (200.8/6020A/7470A[12])	5			500-ml HDPE[13] container	Nitric Acid (HNO_3)	6 months/28 days (Hg)
	ID IDTL VOCs (8260B) and EDB (8011)[14]	0 [5*3=15]			(3) 40-ml glass vials	Hydrochloric acid (HCL), no headspace, Cool to 4°C	14 days
	PAHs (8270C)	0 [5*2=10]			(2) 1-liter Amber glass jars	Cool to 4°C	14 days
	Pesticides (8081B/8270C) Herbicides (8151A)	5			1-liter Amber glass jars	Cool to 4°C	7 days
	Nutrients (SM 4500 NO3F/SM 4500 NH3/SM 4500 NORGC/ SM 4500 PF)	5			500-mL HDPE container	Sulfuric Acid (SO_4)	28 days

Notes:
1. Groundwater and soil (surface soil and UST soil) samples include field duplicate (QC sample); number in brackets indicates only collect/submit if site conditions warrant.
2. SS = Surface soil multi-increment samples
3. UST = Underground storage tank (UST) basin samples
4. Samples from soil borings
5. USEPA Method 200.8 (USEPA, 1994a)
6. USEPA Method 6020A (USEPA, 2007a)
7. USEPA Method 7471A (USEPA, 2007b)
8. VOCs – Volatile organic compounds; USEPA Method 8260B (USEPA, 1996)
9. PAHs – Polycyclic aromatic hydrocarbons; USEPA Method 8270C (USEPA, 2007d)
10. USEPA Method 8081B (USEPA, 2007c)
11. USEPA Method 8151A (USEPA, 1996a)
12. USEPA Method 7470A (USEPA, 1994b)
13. HDPE - High density polyethylene
14. EDB - Ethylene Dibromide; USEPA Method 8011 (USEPA, 1992)

1.3.4 Project Timetable

This project's major tasks are outlined below:

- QAPP and site-specific Health and Safety Plan preparation and approval (February 2012)
- Site surveying (February/March 2012)

- Coordination with Analytical Laboratory (February/March 2012)
- Site utility locates (February/March 2012)
- Field work (February/March 2012)
    - UST removal, PCS over-excavation and tank basin confirmation soil and/or groundwater sampling
    - Drilling and well installation, site soil and groundwater sampling
- Laboratory Analysis (February/March 2012)
- Risk Evaluation (March/April 2012)
- Report Preparation (March/April 2012)
- Draft Report Submittal (April 2012)
- Report Finalization (April 2012)

1.4 Quality Objectives and Criteria

Consideration of data quality begins with the identification of data uses and data types. The USEPA Data Quality Objective (DQO) process used as a model for this project is described in *USEPA Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4)* (USEPA, 2006). This document outlines processes that are general in nature to any environmental investigation.

1.4.1 Data Quality Objectives Process

The DQO process results in a set of specifications needed to support the qualitative and quantitative design of a data collection effort. DQOs are used to assess the adequacy of data in relation to their intended use (USEPA, 2002a,b). USEPA's seven-step process for DQO development is presented below (Figure 4) to communicate the quality objectives for site assessment activities associated with the Moscow Brownfields corridor and other negatively impacted and/or stigmatized areas.

1.4.1.1 State the Problem

The 317 West 6th Street site historical bulk storage and transfer of agricultural chemicals is a REC with respect to the site. A heating oil UST (300 to 500 gallon) is also located on-site with potential to contribute petroleum contaminants to site soil and/or groundwater. This assessment will evaluate whether RECs have negatively impacted the site and will provide data for use in IDEQ's REM.

1.4.1.2 Identify the Decision

Samples will be collected and analyzed for the analytes identified in Table 1. Analyte concentrations will be compared against IDEQ REM IDTLs (IDEQ, 2004) and/or IDEQ petroleum rule RUSLs (IDEQ, 2011).

1.4.1.3 Identify Inputs to the Decision

Analytical data are needed to adequately evaluate potential impacts to the project site's soil and groundwater. The targeted analytes and regulatory action levels (IDTLs/RUSLs) needed to adequately provide information for decisions on potential constituents of concern (COCs) are provided in this QAPP (Table 1) and Appendix B. Specifics on those methodologies and relevant measurement characteristics can be found in Section 2.0.

1.4.1.4 Define the Study Boundaries

The site is located at 317 West 6th Street, on the southwest corner of 6th and Jackson Streets within the City's Urban Renewal District. The site location is shown in Figure 3, including site features targeted during this assessment and proposed exploration locations for groundwater monitoring wells and soil.

1.4.1.5 Develop a Decision Rule

Site assessments involve collecting environmental data to support cleanup alternatives and/or redevelopment. Cleanup alternatives will likely focus on cleanup or removal of routes of exposure to contamination by human and ecological receptors. To assess the feasibility of cleanup and/or redevelopment, TerraGraphics will evaluate available data and make decisions based on the following decision statements:

- Do portions of the site contain contaminants above cleanup levels that would preclude residential, commercial, and/or recreational redevelopment or use?
- Does contamination at the site have the potential to negatively affect human health and/or the environment?
- Are there portions of the site that will not require any assessment or cleanup prior to redevelopment, remodeling or demolition, and/or continued use?

1.4.1.6 Specify Limits on Decision Errors

Detection limits will meet the DQOs for comparison to the IDTLs and RUSLs or multiples thereof.

To ensure the data quality is acceptable for use, Section 4.0 outlines all the specified tolerable limits and decision errors for the data obtained during this project.

1.4.1.7 Optimize the Design for Obtaining Data

Samples will be collected referencing this QAPP and/or subsequent amendments to provide data for decision making.

Figure 4. DQO Process Flow Chart

1. State the Problem:

Determine if recognized environmental conditions have negatively impacted the project site.

↓

2. Identify the Decision:

Do the identified on-site RECs result in COC concentrations that exceed Idaho's targeted action levels (e.g., IDTLs, RUSLs, RSLs)?

↓

3. Identify Inputs to the Decision:

Research and/or sample data collected from the project site, including soil and groundwater data.

↓

4. Define the Study Boundaries:

The site is located at 317 West 6th Street in Moscow, Idaho (Figure 3). Soil and groundwater data will be collected.

↓

5. Develop a Decision Rule:

Concentrations for samples collected will be compared against IDEQ REM IDTLs and/or IDEQ petroleum rule RUSLs. Vapor data (if later collected) will be compared to USEPA RSLs (which may also have a multiplier depending on the sample location).

↓

6. Specify Limits on Decision Errors:

Detection limits will meet the DQOs for comparison to the IDTLs/RUSLs/RSLs.

↑ ↓

7. Optimize the Design for Obtaining Data:

Samples will be collected per this site-specific QAPP to provide data for use in the REM.

1.4.2 Data Quality Indicators

The purpose of this section is to provide qualitative and quantitative information that defines the goals for data quality at the site. The primary goal of sampling and analysis is to perform a risk assessment utilizing newly acquired and historical defensible data. The data for this project plan must be of known quality. Table 2 lists the data quality criteria requirements.

1.4.2.1 Precision

Precision is a measure of data variation when more than one measurement is taken on the same sample. The precision estimate for duplicate measurements can be expressed as the relative percent difference (RPD):

$$RPD = \left| \frac{(C_1 - C_2)}{\left(\frac{(C_1 + C_2)}{2}\right)} \right| \times 100\%$$

where: RPD = relative percent difference

C_1 = concentration of QA/QC sample

C_2 = concentration of associated original

Acceptable precision limits are based on past databases, as defined by USEPA. Laboratory duplicate measurements will be obtained for each set of samples submitted and analyzed.

1.4.2.2 Accuracy

Accuracy of laboratory analysis is assessed by measuring standard reference material and spiked samples. Standard reference materials are used to calibrate laboratory measurement instruments.

Accuracy is determined by splitting a sample into two portions, spiking one portion with a known quantity of a constituent of interest, and analyzing both portions determine spike recovery. Spike recovery is expressed as percent recovery:

$$\%R_S = \left| \frac{(SC - OC)}{TV} \right| \times 100\%$$

where: $\%R_S$ = percent recovery of spike

SC = spiked sample concentration

OC = original concentration

TV = true value of the added spike

Acceptable spike recovery limits are based on past data sets as defined by USEPA.

1.4.2.3 Representativeness

This term expresses the degree to which the data accurately and precisely represent actual conditions or characteristics of the site. Representativeness may be evaluated for this project using background samples collected from areas isolated from, yet similar to, the site and analyzed for the same constituents. However, representativeness will most likely not be evaluated for this project.

1.4.2.4 Completeness

Completeness is an estimate of the amount of valid data obtained from the analytical measurement system for a given set of data. The percent completeness is defined as the number of samples analyzed that meet the data quality goals divided by the total number of samples analyzed multiplied by 100. The completeness goal for this project is 95%.

Table 2. Data Quality Criteria Requirements

Data Quality Parameter	Acceptable Criteria
Precision	± 20%
Accuracy (Bias)	75%-125%
Completeness	95%

1.4.2.5 Comparability

Using standard USEPA accepted protocols, all matrix-specific samples will be collected, processed, and analyzed at sufficient detection limits, precision, and accuracy for correlation with existing available data.

1.5 Special Training/Certification

A qualified Environmental Scientist will oversee all sampling activities and serve as the Site Safety and Health Officer for the site. Personnel performing sampling at the site will have training required by 29 Code of Federal Regulations (CFR) 1910.120 if necessary (Occupational Safety and Health Administration Hazardous Waste Operations Health and Emergency Response Training). Documentation of necessary training and certifications will be provided upon request. The site-specific Health and Safety Manual is provided in Appendix A.

1.6 Documentation and Records

1.6.1 Field Operation Records

The following section identifies record collection methods, field procedures, and any corrective actions that may take place during sampling events.

1.6.1.1 Sample Collection Records

1.6.1.1.1 Field Logbook

A *Rite-in-the-Rain®* (or similar) field notebook will be used in the field to document the samplers' names, sample numbers, sample location points, maps and diagrams, equipment/method used for sample collection, weather conditions, and unusual observations. Field notebooks will be pre-numbered and will contain the date and signature lines.

1.6.1.1.2 Photographic Records

Photographs will be taken of representative sampling locations and the surrounding site to show the area, related site activities, and sampling equipment.

1.6.1.2 Chain-of-Custody Records

The chain-of-custody record will be filled out and kept to track samples from collection through delivery to the laboratory following the ASTM guidance *Standard Guide for Sampling Chain-of-Custody Procedures (D-4840-99)* (ASTM, 2004).

1.6.1.3 QA/QC Sample Records

QA/QC samples (i.e., field and equipment rinsate blanks and duplicates) will be documented in the field notebook. This documentation will include custody seals, calibration history, level of standards, and the frequency and type of the QA/QC sample.

1.6.1.4 General Field Procedures

The field procedures will be documented in the field notebook and will specify the method of collection (i.e., bailer, low-flow peristaltic pump) and location, and will identify potential areas of difficulty in the actual gathering of the specimens.

1.6.1.5 Corrective Action Reports

Should the primary method of sample collection fail, the corrective action or alternative method will be documented in the field notebook and reported in the subsequent final Phase II ESA report. For instance, should a low-flow peristaltic pump collection system fail (e.g., static water is greater than 20 feet bgs), a well may be sampled using hand bailers.

1.6.2 Laboratory Records

1.6.2.1 Sample Data

Laboratory methods will follow the USEPA guidance, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)* (USEPA, 2008), which includes recording the date that samples were analyzed to verify holding times were met. The overall number of samples, sample location information, and date will be reported as well as any corrective action procedures for samples violating this QAPP and/or protocol.

1.6.2.2 Sample Management Records

The laboratory will maintain detailed procedures for its recordkeeping in order to support the validity of analytical work. Each data report package submitted to TerraGraphics will contain the analytical laboratory's written certification that the requested analytical method was run and that QA/QC checks were performed. After a technical data review conducted by the laboratory and the project QA officer, the data will be sent to the City where it will be archived according to State or Federal records retention policies, whichever is more restrictive.

1.6.2.3 Test Methods

The test methods used will be those identified in Table 1 as appropriate for sample type. Should an alternative analysis be required, the laboratory will document and describe how the analyses were carried out in the laboratory. This will include sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific QC criteria.

1.6.2.4 QA/QC Reports

Laboratory QA/QC methods will follow the USEPA guidance, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)* (USEPA, 2008). The report will include laboratory QA/QC data from blanks, spikes (MS) and matrix spike duplicates (MSD), and duplicates. TerraGraphics will complete internal QA/QC to ensure the quality of the data.

1.6.3 Data Handling Records

The Laboratory's QA personnel will perform the data validation. The data validation will convert raw data into reportable quantities and units by properly applying significant figures, recording extreme values, and identifying data qualifiers. The data will then be transmitted electronically and/or in hard copy to TerraGraphics, who will perform internal QA/QC. The internal QA/QC will document that the data meet the proposed DQOs.

Section 2.0 Data Generation and Acquisition

2.1 Sampling Process Design

Proposed site soil and groundwater sampling activities are described in Section 1.3; sampling locations are depicted on Figure 3. The site sampling methods presented in Section 2.2 support the following site activities:

- Six site surface soil multi-increment samples will be collected to evaluate metals and pesticide/herbicide impacts to site surface soil and the surface soil exposure pathway. One duplicate soil sample will be collected for QA/QC purposes.
- The UST will be excavated and up to five soil samples will be collected by shovel or hand from the UST basin excavation after removal of the UST to evaluate potential site soil and/or groundwater petroleum contamination. Samples will be screened for volatile organic compounds (VOCs) using a portable PID and soil samples will be collected based upon information gathered in the field. One duplicate soil sample will be collected for QA/QC purposes.
- Four soil borings will be conducted. Up to seven subsurface soil samples will be collected from the soil borings to evaluate metals and pesticide/herbicide impacts to site subsurface soil and the soil leaching to groundwater pathway. Petroleum constituents may also be analyzed for if it appears the UST leaked and the contamination migrated.
- Four monitoring wells will be installed at the same locations as the soil borings.
- Groundwater samples will be collected from the four newly installed monitoring wells to evaluate metals, pesticide/herbicide, and nitrogen impacts to site groundwater and the groundwater exposure pathway. Petroleum constituents may be analyzed if warranted (e.g., if groundwater is observed in the UST excavation). One duplicate groundwater sample will be collected for QA/QC purposes.

2.2 Sampling Methods

2.2.1 Soil Samples

Multi-increment surface soil samples will be collected from the upper 6 inches to 1 foot of the soil horizon utilizing a driven macro-core sampler with disposable liners and/or dedicated stainless steel trowel following the guidance document, *Draft Guidance on MULTI INCREMENT Soil Sampling* (ADEC, 2009). Multi-increment sample aliquots will comprise approximately equal volumetric proportions. Aliquots will be placed in a decontaminated (per the following decontamination procedure) stainless steel bowl and mixed/homogenized with a single use, stainless steel spoon. The mixed/homogenized sample will then be split to obtain an appropriate sample volume for laboratory analysis.

Subsurface soil samples will be collected using direct push methods, a stainless steel macro-core barrel and disposable liners per ASTM D-6282-98 (ASTM, 2005). Using a direct push drill rig, a single tube, 2-inch diameter, 5-foot length macro-core barrel will be driven in 5-foot increments (0-5 feet, 5-10 feet, 10-15 feet, etc.) to the target depth of the borehole, which is approximately 15 feet bgs. When necessary (hole collapses, excessive slough, below water table), a piston and point with o-ring will be used to seal the sampler. Once the sampler has been driven to the depth of deployment (beginning of new interval to be sampled), the piston will be released to allow the unconsolidated formation (soil) to enter the sampler, collecting sample from a discrete interval bgs. A new macro-core liner will be used to collect each sample interval.

Upon retrieval, liners will be cut to expose the soil and lithology will be entered into the bore log. Soils will be classified referencing the United Soil Classification (ASTM D2487-98) (ASTM, 2003). Soil samples collected for VOC analysis will be screened using a PID. When analyzing for VOCs, the exterior of the soil will be scraped away with a stainless steel knife to expose fresh soil immediately after cutting the liner, and that soil will be collected using an EnCore sampler (or equivalent). The sample will be capped with a Teflon® lid to minimize air space for volatilization.

Recommended bottle types and preservatives for each COC are listed in Table 1, although the laboratory generally determines the types and sizes of bottles to be used. All sample containers will be labeled with time, date, borehole identification, depth bgs and sampler's name, placed in a refrigerated cooler containing double-bagged ice immediately after collection, and held under chain-of-custody for delivery.

Soil cuttings will be containerized and stored on-site, then disposed of at an appropriate facility once characterized. The macro-core barrel will be decontaminated with an Alconox solution, cleaned, and rinsed with potable water prior to successive trips down the borehole. All tooling will be decontaminated with an Alconox solution then pressure washed with potable water between borings. All borings will be sealed with bentonite chips and/or the placement of bentonite grout via the tremie method as per Idaho Department of Water Resources (IDWR) regulations. Based upon information provided by IDEQ, it is assumed the cuttings will not be considered hazardous waste; however, this will ultimately be determined by sample results.

2.2.2 Groundwater Samples

Groundwater monitoring wells will be developed and sampled referencing ASTM D-4448-01, *Standard Guide for Sampling Ground-Water Monitoring Wells* (ASTM, 2007). Disposable single-use ⅜-inch high-density polyethylene (HDPE) tubing will be inserted into the screened interval at each well and positioned opposite the screen. Water samples will be collected with a peristaltic pump at a low flow rate. Prior to collecting groundwater samples, wells will be developed, then purged using a peristaltic pump until water quality parameters have stabilized. Table 3 lists the stabilization criteria for temperature, pH, and specific conductance. Water quality parameters to be measured in the field are temperature, pH, dissolved oxygen (DO), specific electrical conductance (SEC), and oxidation/reduction potential (ORP). Field parameters are primarily used to determine recharge stability of the well and to ensure a groundwater sample is representative of the formation. Purge water will be containerized and stored on-site, then disposed of at an appropriate facility once characterized.

Recommended bottle types and preservatives for each COC are listed in Table 1, although the laboratory generally determines the types and sizes of bottles to be used. Samples will be collected after the water quality parameters stabilize or after 45 minutes. All samples will be placed in a refrigerated cooler containing double-bagged ice immediately after collection, cooled to ≤ 4°C, and held under chain-of-custody for shipment.

Table 3. Groundwater Sampling Parameter Stabilization Criteria

Parameter	Stabilization Criteria	Reference
temperature	± 0.2°C	Wilde, 2008
pH	± 0.1	Puls and Barcelona, 1996; Wilde, 2008
SEC	± 3%	Puls and Barcelona, 1996

2.3 Sample Handling and Custody Procedures

The following section identifies the sample numbering system and chain-of-custody procedures. To prevent duplication and allow future users of the data to quickly identify general sample locations by site, all sample numbers will start with the site designations S1, S2, S3, S4, or S5, as applicable. The 317 West 6th Street site will have a designation of S2.

2.3.1 Sample Numbering System

Each surface soil sample collected will have a unique field sample identification code that will include the site identification name and the date the sample was collected. The field sample identification code will be in the following format: (Site Identification Name-Surface Sample-Number Depth-in-feet)MMDDYY. For example, the field sample identification code for the first surface soil sample collected from Area 3 at a depth of 5 feet on March 3, 2012 would be (S2-SS3-01 5ft)030312.

Each soil sample collected from the UST basin will have a unique field sample identification code that will include the site identification name and the date the sample was collected. The field sample identification code will be in the following format: (Site Identification Name-UST-Number Depth-in-feet)MMDDYY. For example, the field sample identification code for the first soil sample collected from the UST at a depth of 5 feet on March 3, 2012 would be (S2-UST-03 5ft)030312.

Each soil boring sample collected will have a unique field sample identification code that will include the site identification name and the date the sample was collected. The field sample identification code will be in the following format: (Site Identification Name-Borehole Number Depth-in-feet)MMDDYY. For example, the field sample identification code for a borehole soil sample collected from borehole number 4 at a depth of 5 feet on March 3, 2012 would be (S2-BH-04 5ft)030312.

Each groundwater sample collected will have a unique field sample identification code that will include the site identification name and the date the sample was collected. The field sample identification code will be in the following format: (Site Identification Name-Monitoring Well Number)MMDDYY. For example, the field sample identification code for a groundwater sample collected from monitoring well 3 on March 4, 2012 would be (S2-MW-03)030412.

The field sample identification code for the collection of soil and water QA/QC samples (field duplicate) will also include a unique QA/QC identifier. After the date "DUP" will be added to the identification code. For example, the field sample identification code for a field duplicate sample collected at borehole number 2 at a depth of 5 feet on March 3, 2012 would be (S2-BH-02-5ft)030312DUP.

2.3.2 Sample Custody

Each sample will be identified on a chain-of-custody record. Information recorded will include at a minimum the site name, sampler name(s), date and time of sample collection, sample identification, number of containers for each sample, analyses requested for each sample, and signature blocks for each individual who has custody of the sample(s). Samples will be submitted to the laboratory and maintained at the laboratory under chain-of-custody. Final reports, which include all original laboratory reports and chains-of-custody, will be maintained in the TerraGraphics project file system.

2.4 Analytical Methods

Samples will be analyzed for all COCs using *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)* (USEPA, 2008) by an external analytical laboratory. Sample analysis will be in accordance with approved USEPA analytical methods (see Table 3 for techniques, method numbers, and reporting limits for analysis). Reporting limits for soil and groundwater will meet or be less than the IDEQ REM IDTLs (IDEQ, 2004) and/or IDEQ petroleum rule RUSLs (IDEQ, 2011).

2.5 Quality Control

QC samples will be employed to evaluate data quality. QC samples are controlled samples introduced into the analysis stream whose results are used to review data quality and to calculate the accuracy and precision of the chemical analysis program. The purpose of each type of QC sample, collection and analysis frequency, and evaluation criteria are described in this section.

2.5.1 Field Quality Control Checks

Field QC checks are accomplished through the analysis of controlled samples that are introduced to the laboratory from the field. Field duplicate samples (QC samples) indicate the precision of the sampling and analysis program for detectable analytes. Field duplicates will be collected from soil and groundwater and submitted to the laboratory, to provide a means of assessing the quality of data resulting from the field sampling program.

Table 4. Techniques, Method Number, and Reporting Limits for Analyses

Analyte	Method	Reporting Limit[1]
Soil		
ID IDTL VOCs	USEPA 8260B[2]	See Appendix B
PAHs	USEPA 8270C[3]	See Appendix B
RCRA-8 Metals [c]	USEPA 200.8[4]/6020A[5]/7471A[6]	See Appendix B
Pesticides/Herbicides/Fertilizer	USEPA 8151A[7]/8081B[8]/ 8270C[3]	See Appendix B
Water		
ID IDTL VOCs	USEPA 8260B[2]	See Appendix B
PAHs	USEPA 8270C[3]	See Appendix B
RCRA-8 Metals [c]	USEPA 200.8[4]/6020A[5]/7470A[9]	See Appendix B
Pesticides/Herbicides/Fertilizer	USEPA 8151A[7]/8081B[8]/ 8270C[3]	See Appendix B
Nutrients (e.g., Nitrogen, Phosphorous, etc.)	SM 4500 NO3F/SM 4500 NH3/SM 4500 NORGC/SM 4500 PF	See Appendix B

Notes:
[1] Reporting limits for soil and groundwater will meet or be less than the IDEQ REM IDTLs (IDEQ, 2004) and/or IDEQ petroleum rule RUSLs (IDEQ, 2011). These tables can be found in Appendix B; IDTL and/or RUSL concentrations presented in Appendix B tables in orange font are below the practical quantitation limit (PQL); IDTL and/or RUSL concentrations presented in red font are below the method detection limit (MDL). TerraGraphics will request that the laboratory report detection of these compounds below the PQL and, although the MDL may be above the IDTL, any detection of these compounds will be utilized to indicate that additional evaluation is warranted. Note that laboratory test results reported between the MDL and PQL will be qualified by the analytical laboratory, and will be considered of acceptable quality for the above compounds given the current analytical methods limitations for these chemicals.

[2]USEPA Method 8260B (USEPA, 1996)

[3]USEPA Method 8270C (USEPA, 2007b)

[4]USEPA Method 200.8 (USEPA, 1994a)

[5]USEPA Method 6020A (USEPA, 2007c)

[6]USEPA Method 7471A (USEPA, 2007a)

[7]USEPA Method 8151A (USEPA, 1996a)

[8]USEPA Method 8081B (USEPA, 2007d)

[9]USEPA Method 7470A (USEPA, 1996b)

For solids, the field duplicate sample is one portion of a double-volume solid sample that is homogenized (mixed) before the sample containers are filled and the other portion is the primary sample. Duplicate samples for VOC analysis will be co-located with the primary sample to minimize volatilization. Duplicates are prepared by filling a second sample container with the same homogenized soil from the most recent sample area and interval, and marking the soil tag as a duplicate sample.

The duplicate water sample is collected immediately after the original sample. The sample bottle is labeled as a duplicate sample.

The QC samples, along with the original samples, will be sent to the analytical laboratory. QC samples will be collected at a frequency of 1 per sampling event per site, or 1 per 20 samples, whichever is greater (Table 5).

Table 5. Field Quality Control Checks

Quality Control Check	Frequency
Field duplicate (soil)	1:20 samples
Field duplicate (groundwater)	1:20 samples

2.5.2 Laboratory Quality Control Checks

QC procedures for the laboratory's analyses will be consistent with the requirements described in the laboratory's Standard Operating Procedures (SOPs) and QA manuals. The laboratory QC will include appropriate duplicates, laboratory control samples (LCS), matrix spikes/duplicates (MS/MSD), method blanks, reporting limits, holding times, dilutions, etc., as outlined in the appropriate guidance document. The frequency of each type of sample is shown in Table 6.

Table 6. Laboratory Quality Control Checks

Quality Control Check	Frequency
MS/MSD	1:20 samples
LCS	1:20 samples
Method Blanks	1:20 samples
Laboratory Duplicates	1:20 samples

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

Field measurement equipment used to support sampling will be tested, inspected, and maintained in accordance with the manufacturer's specifications. Testing and maintenance activities will be recorded in the field logbook.

The laboratory will be responsible for the maintenance of laboratory instruments and equipment. Instruments, and the measurements made as part of the analytical methodology, will be as specified in the method, without modification. The laboratory's QA program ensures that only trained personnel perform routine maintenance on all major instruments and that repairs are performed by trained laboratory personnel or service technicians employed by the instrument manufacturer or representative. Instrument maintenance will be appropriately documented through the use of instrument logs, which will be included in the laboratory project file.

2.7 Instrument/Equipment Calibration and Frequency

Laboratory instrument calibration and frequency will follow the guidance outlined in USEPA methodology and certification requirements. Field instruments (e.g., PID, water quality probe) will be calibrated in accordance with the manufacturer's specifications, and the calibration confirmation will be documented in the field notebook.

2.8 Inspection/Acceptance of Supplies and Consumables

2.8.1 TerraGraphics

TerraGraphics will use adequate quality services and supplies. Supplies and consumables utilized for this project will be selected based on manufacturer recommendations and/or on the standard of practice for the service being accomplished.

2.8.2 Anatek

Anatek will use services and supplies of adequate quality. Anatek maintains a procedure for the purchase, storage, and evaluation of supplies and services. Records of inspections, verifications, and supplies will be maintained by Anatek.

2.9 Non-direct Measurements

This project may rely upon secondary data including online IDEQ regulatory data, interviews, and other historical data as shown in Table 7.

Table 7. Non-Direct Measurements (i.e., Secondary Data)

Data Sources	Intended Use	Rationale for Use	Acceptance Criteria
Previous Investigation Reports	Historic background	Accepted source of site information	Not required; reference information only

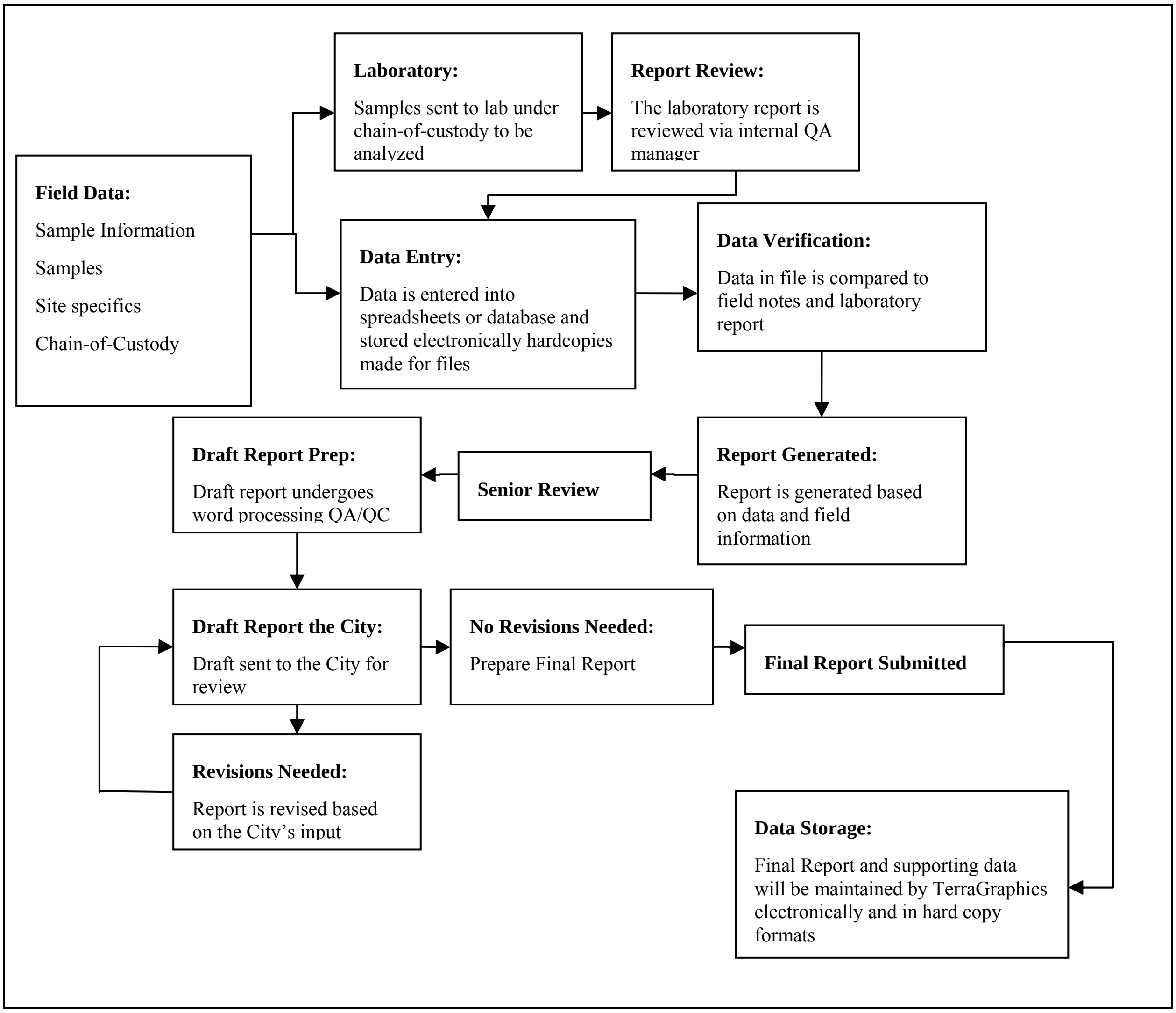
2.10 Data Management

Figure 5 is a diagram for data management process.

2.10.1 Data Validation

TerraGraphics will conduct an internal data validation of the laboratory-supplied data in accordance with the *USEPA Guidance on Environmental Data Verification and Data Validation* (USEPA, 2002a). This document contains the details on technical data review criteria such as precision, bias, accuracy, representativeness, comparability, and completeness. Specifics on each criterion are discussed in Section 1.4.2. TerraGraphics will conduct an internal data validation and QA/QC review of all data collected in the field and provided from the Laboratory.

Figure 5. Data Management Diagram



2.10.2 Data Recording

TerraGraphics will receive the data from the laboratory and prepare useful data tables. After TerraGraphics has conducted the internal data validation, the data tables will be updated with relevant data qualifiers.

2.10.3 Data Transformation

The raw or validated data will be available for third party data transformation by request.

2.10.4 Data Transmittal

Either Microsoft Excel © or Access © will be used for the transmittal and tracking of data.

2.10.5 Data Reduction

No data reduction will be completed as part of this project. Third parties may reduce the data in the future for analysis and modeling.

2.10.6 Data Analysis

The data may be subjected to various statistical analysis and/or modeling supporting risk analysis. In general, minimum, maximum, means, standard deviations, confidence intervals correlation with water levels, etc., may be generated. The specific statistical and/or modeling program used will be determined by the project and a full description will be documented in the final report.

2.10.7 Data Tracking

This project will use Microsoft Excel © or Access © to track sample numbers and forms.

2.10.8 Data Storage and Retrieval

The data will be stored in electronic form as a Microsoft Excel © or Access © document. In addition, hard copies will be available upon request.

Section 3.0 Assessment and Oversight

3.1 Assessments and Response Actions

Inspections will consist of, as appropriate, an evaluation of QA/QC procedures and the effectiveness of their implementation, an evaluation of work areas and activities, and a review of project documentation to verify compliance with QAPP requirements. Additional inspection items may be added, as necessary by the Project Manager, Environmental Scientist, or the City.

Field operations assessments by the Environmental Scientist or designee may include evaluating the availability of appropriate and approved procedures; implementation of sampling procedures; calibration and operation of equipment; labeling, packaging, storage and delivery of samples; and documentation of deviations from the QAPP and nonconformance.

All inspection findings that are not resolved during the course of the assessment and affect the overall quality of the project will be discussed immediately with the Project Manager, regardless of when they are resolved. The Project Manager will ensure the necessary corrective actions are initiated and completed.

3.2 Reports to Management

The data from this Phase II ESA's sampling events will be made available to the City, IDEQ, and USEPA. An environmental assessment report will be prepared and delivered to the City. The report will describe sampling procedures and provide photographs and figures of sampling locations. The report will discuss analytical precision, accuracy, representativeness, comparability, completeness, and sensitivity, and whether the analytical data meet the project DQOs. If COCs are detected above the reporting limits, a site characterization description will be provided in the report. Electronic report copies will be provided.

Section 4.0 Data Validation and Usability

4.1 Data Review, Verification, and Validation

Data deliverables will include a case narrative, analytical results, and laboratory QC sample results. Review of analytical data will be performed by the Laboratory under the direction of the Laboratory's technical staff and QA Officer. Laboratory procedures for data review are discussed in the Laboratory QA Plan. The case narrative will identify whether any laboratory QC data are outside of the Laboratory's QC criteria. TerraGraphics will track the status of the data from time of sample collection through analysis and reporting. Once the data are reported by the laboratory, the City's consultant will review the sample data, case narratives, and lab and field QC data to determine the data quality and assess data usability relative to the project's DQOs.

4.2 Verification and Validation Methods

Data will be verified by reviewing chain-of-custody forms, sample preservation records, analytical holding times, case narratives, sample data as compared to QC sample data, requested turnaround time, and reporting requirements. Problems or questions will be discussed with the Laboratory by the data reviewer for resolution and/or documentation.

Data will be validated upon reviewing data quality indicators, and data qualifiers will be applied to the data based on *USEPA Guidance on Environmental Data Verification and Data Validation* (USEPA, 2002b).

4.3 Reconciliation and User Requirements

Data assessment will involve reviewing the data with respect to project DQOs. A data usability assessment summary will be included in the Phase II report. If project DQOs are not satisfied, the TerraGraphics' Project Manager will review the circumstances affecting the data usability and evaluate alternative options or resolutions. This person will notify the City and discuss the available alternatives and the recommended resolution of the issue.

Section 5.0 Resources Used

29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," Title 29, Code of Federal Regulations, Part 1910.

Alaska Department of Environmental Conservation (ADEC), 2009. Draft Guidance on Multi Increment Soil Sampling. March.

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ASTM, 2007. D-4448-01, Standard Guide for Sampling Ground-Water Monitoring Wells.

Idaho Department of Environmental Quality (IDEQ), 2004. Idaho Risk Evaluation Manual. April.

IDEQ. 2011. IDAPA 58.01.24 - Application of Risk Based Corrective Action at Petroleum Release Sites.

Puls, R.W., and M.J. Barcelona, 1996. Ground-Water Issue Paper: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures; USEPA, EPA/540/S-95/504.

STRATA, 2010. Phase I ESA 217 West 6th Street Moscow, Idaho. July 29, 2010.

TerraGraphics, 2011. Master Quality Assurance Project Plan for the City of Moscow Brownfields Phase II Environmental Site Assessments, Moscow, Idaho. October 31, 2011.

TerraGraphics, 2006. Standard Protocol for Ground Water Sampling. July.

U.S. Environmental Protection Agency (USEPA), 1992. Method 8011: 1,2-dibromoethane and 1,2-dibromo-3-chloropropane by Microextraction and Gas Chromotography, Revision 0, July 1992.

USEPA, 1994a. Method 200.8; Determination of Trace Elements in Waters and Wastes by ICP-MS. May 1994: Revision 5.4.

USEPA, 1994b. Method 7470A; Mercury in Liquid Waste (Manual Cold Vapor Technique); September 1994: Revision 1.

USEPA, 1996a. Method 8151A; Chlorinated Herbicides by GC using Methylation or Pentafluorobenzylation Derivatization. December 1996: Revision 1.

USEPA, 1996b. Method 8260B; Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). December: Revision 2.

USEPA. 1999. Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition. USEPA/625/R-96/010b. January.

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USEPA. 2002a. Guidance for Quality Assurance Project Plans. USEPA QA/G-5. December.

USEPA, 2002b. Guidance on Environmental Data Verification and Data Validation, USEPA QA/G-8. November.

USEPA. 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process. USEPA QA/G-4. February.

USEPA, 2007a. Method 6020/6020A; Inductively Coupled Plasma-Mass Spectrometry. February 2007: Revision 1.

USEPA, 2007b. Method 7471A; Mercury in Solid or Semi-solid Waste (Manual Cold Vapor Technique) February 2007: Revision 2.

USEPA. 2007c. Method 8081B; Organochlorine Pesticides by Gas Chromotography. February 2007: Revision 2.

USEPA, 2007d. Method 8270C Semivolatile Organic Compound by Gas Chromatography/Mass Spectrometry (GC/MS). February 2007: Revision 4.

USEPA, 2008. Method SW-846; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. January 2008: Update IV, 3rd Edition. [Note: each method will have a specific year]

USEPA. 2009. National Primary Drinking Water Regulations. USEPA 816-F-09-004. May.

Wilde, F.D., 2008. Guidelines for Field-Measured Water Quality Properties – Chapter 6. In the U.S. Geological Survey's National Field Manual for the Collection of Water-Quality Properties.

Appendix A

Health and Safety Plan

Health & Safety Plan
Phase II Environmental Site Assessment for
317 West 6th Street Property

General Information:

CLIENT: City of Moscow
PROJECT MANAGER: Robin Nimmer
SITE NAME/SITE LOCATION: 317 West 6th Street Property, Moscow, Idaho

Article I. Site Characteristics

PROJECT LOCATION:

The site is located at 317 West 6th Street in Moscow, Idaho. The subject property sits on the southwest corner of 6th and Jackson Streets. Historically the site and surrounding southern and western adjacent properties were/are occupied by industrial agricultural businesses supported by the former railroad corridor; a former railroad spur line bisects the western and eastern site. The property consists of an empty, single one-story building. The remainder of the property is an asphalt- or gravel-covered parking lot.

DESCRIPTION OF FIELD ACTIVITIES:

The activities to be performed involve collection of soil samples and groundwater samples, and air samples if deemed necessary, from areas where recognized environmental conditions (RECs) have been identified.

WASTE CHARACTERISTICS:

a) Waste Type(s)
Liquid__X___ Solid__X___ Sludge__X___ Gas_____ Dust__X__

b) Characteristics
Corrosive____ Ignitable____ Radioactive____ Volatile__X__
Toxic__X__ Reactive____ Unknown____ Other_____

Article II. Hazard Evaluation

HAZARD EVALUATION:

a) Chemical Hazards
Based upon review of the previous assessments, potential chemical hazards on the site include benzene, toluene, ethylbenzene, total xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), methyl-tertiary-butyl-ether (MTBE), ethylene-dibromide (EDB), ethylene-dichloride (EDC), Resource Conservation and Recovery Act (RCRA)-8 metals, herbicides, organochlorine pesticides, and organophosphorous pesticides.

Site personnel are trained in hazard recognition and will use personal protective equipment (PPE) appropriate to the potential hazards.

b) Routes of Exposure
Exposure could occur via inhalation or ingestion.

- Inhalation sources include windblown dusts during sampling activities. Samplers must take extra care to ensure airborne dust is not generated while sampling soil areas. In order to control inhalation of these contaminated dusts, it will be necessary to control dust levels. Dust control will be most important in areas where metal concentrations are suspected to be the highest. Measures to reduce exposure to dust include careful sample handling and strict enforcement of practices such as prohibiting samplers from shaking out dusty clothing or using compressed air to blow off dust.
- Ingestion of contaminated soil could occur not only from inhaling dust, but also from hand-to-mouth activities. To reduce the possibility of exposure, personnel must wash their hands and face prior to eating, drinking, using tobacco products, or applying cosmetics.

c) Air Monitoring
Direct read air monitoring equipment may be employed to screen for contaminants and toxic or flammable atmospheres prior to collecting samples if the project manager, or site supervisor, deems it appropriate.

PHYSICAL HAZARDS:

There will be no trenching or confined space hazards. However, *bending and kneeling* will be required. Bending at the waist should be avoided. Knee pads will be provided if needed.

Certain operations may create *noise* levels that exceed the applicable limits. Operations expected to be in excess of 85 dBA steady state or 140 dBA impulse will require either hearing protection and/or isolation of unprotected workers from the noise source. As a rule of thumb, doubling of distance will reduce noise exposure by 6 dBs. Hearing protection will be provided for oversight personnel and will be required when noise levels warrant their use.

There is a potential for *slipping, tripping, and falling* while working. All personnel working on the project will be aware of walking surface conditions and watch for slipping, tripping, and falling hazards. All project personnel will wear appropriate PPE identified below.

Meteorological conditions will be watched closely, especially in the spring, summer, and fall when severe thunderstorms are likely to occur. Thunderstorms often occur late in the afternoon on hot spring days, but can occur at any time of the day in any season of the year. All outdoor work shall cease immediately during a thunderstorm or severe thunderstorm warning in the local area.

Project personnel will monitor for signs and symptoms of *cold stress*. Should any of the following symptoms occur—extreme shivering, disorientation, white or gray color of the skin on the ends of fingers, nose, or ears—the affected person is to immediately leave the work area, drink warm fluids or otherwise warm up, and change into dry clothes, as necessary. If the symptoms do not subside after a reasonable rest period, the affected person shall notify their supervisor and Health and Safety Officer (HSO) and seek medical assistance. The HSO will be alert to signs of cold stress in site personnel and increase the frequency of breaks and warm-up schedule as necessary.

Project personnel will monitor for signs and symptoms of *heat stroke*. Should any of the following symptoms occur—a lack of sweating (usually), hot dry skin, an abnormally high body temperature, irrational behavior, loss of consciousness—the affected person is to be immediately removed from the work area and be placed in a shady area and the outer clothing removed. The worker’s skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Heat exhaustion symptoms include headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly. The fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency. Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

Ventilation, air cooling, fans, shielding, and insulation are the five major types of engineering controls used to reduce heat stress in hot work environments. Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker. The worker(s) should also be allowed to take frequent rest breaks in a cooler environment. Cool (50°-60°F) water or any cool liquid (except alcoholic beverages) should be made available to workers to encourage them to drink small amounts frequently (e.g., one cup every 20 minutes). Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets.

Traffic hazards exist for sampling performed along streets, roads, and alleys. When crew members work on or near streets, roadways and alleys, orange safety vests will be worn. Orange cones will be placed for added safety to warn traffic of work in the area.

Article III. Work Practices

Workers will comply with all TerraGraphics Health and Safety Manual rules. Workers will comply with all state and federal regulations.

GENERAL PRACTICES:

Sample activities generally involve disturbance of potentially contaminated soil and conducting property measurement activities. In general, lifting objects more than 40 pounds is anticipated, and proper lifting procedures should be followed. If possible, the load to be lifted should be lightened. Where lifting of heavy objects or bending is required, proper techniques include bending at the knees and keeping backs straight, or obtaining assistance from other crew members.

Team members need to limit the creation and spread of dust. Practices such as shaking out dusty clothing or using compressed air to blow off dust will be strictly prohibited.

All employees are responsible for performing the tasks assigned to them in accordance with the HSP and all applicable occupational safety and health rules and regulations. All employees are responsible for notifying their immediate supervisor or HSO of any unsafe practice or condition.

All personnel will read this HSP and sign the acceptance form provided in Attachment I. Daily tailgate safety meetings will be held and documented using the form in Attachment II.

PERSONAL PROTECTIVE EQUIPMENT:

Section 100.5 of the most current Health and Safety Manual and Health and Safety Standard Operating Procedures for TerraGraphics addresses PPE selection:

- A Class A, B, or C hard hat as appropriate to the site,
- Steel-toed, steel shank work boots,
- Hearing protection,
- Latex/nitrile gloves, and
- Safety Glasses.

DECONTAMINATION PROCEDURES:

a) Personnel

Before leaving the sample area, thoroughly wash hands and face with soap and water before eating, drinking, or smoking. If water is not available, use pre-moistened towelettes to wash face and hands.

Do not track contaminated soils and dust off-site.

b) Samples

After the sample containers are filled they will be sealed shut, marked with indelible marker, and any excess dirt will be wiped from the outside of the sample containers before they are stored. Sample containers will be transported in suitable sealed containers placed in stable containers that can be securely closed.

c) Disposal of Materials Generated On-Site

Collect trash and non-hazardous waste and place it in appropriate trash receptacles for municipal trash pickup. Potentially contaminated materials will be separated, sealed in chemically compatible containers, and labeled for appropriate off-site disposal.

d) Safety Equipment and Materials
Each sampling team will have access to a first aid kit, clean water, paper cups, and pre-moistened towelettes. Site supervisors will ensure appropriate safety gear is available for site operations. The site supervisor will also be equipped with a cell phone in case of an emergency requiring outside assistance.

Please Note: It is the responsibility of the crew chief / HSO to make sure that all equipment coming off site has been properly decontaminated.

Documentation of decontamination must be entered in the field log book, which will become part of the permanent project file.

Article IV. Emergency Procedures

If an injury occurs, take the following steps:

- Prevent further injury and notify the site supervisor.
- Initiate first aid and get medical attention for the injured person immediately.
- Depending on the type and severity of the injury, call for medical attention.
- Prepare an incident report.
- The crew chief / HSO will assume charge during a medical emergency.

a) Local Emergency Phone Numbers

Ambulance:	911
Hospital:	
Gritman Medical Center	(208) 882-4511 (non-emergency)
700 South Main Street	911 (emergency department)
Moscow, ID 83843	
Poison Control Center:	800-222-1222
Sheriff/Police:	911
118 E 4th Street	(208) 883-7054
Moscow, ID 83843	
Fire Department:	911
	311 (non-emergency)

b) Emergency Contacts

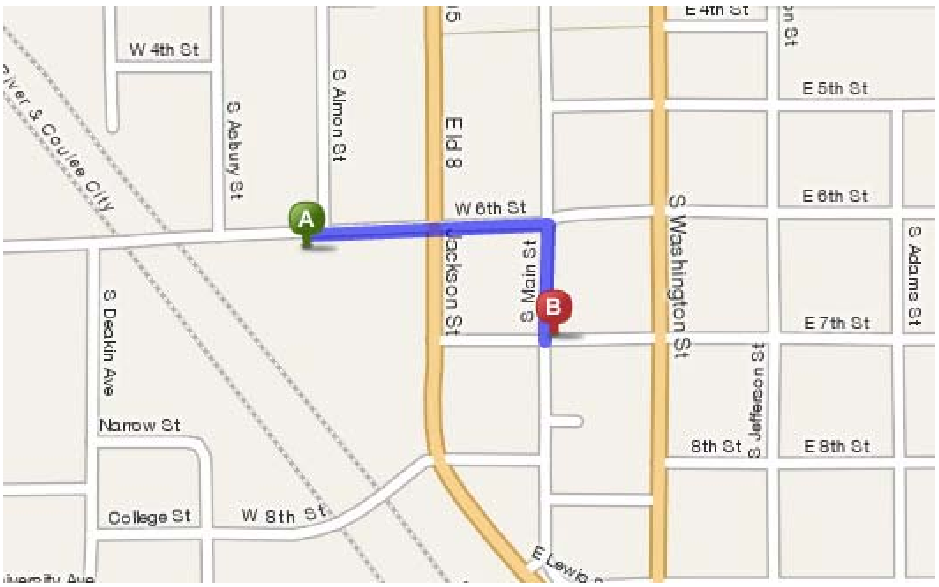
8 am to 5 pm:	TerraGraphics Moscow office	(208) 882-7858
	STRATA	(208) 882-1006
After hours:	Jon Munkers (Mobile)	(208) 791-3663
	Jerry Lee (Mobile)	(509) 330-1700
	Karen Helmick (cell)	(425) 299-0984

Article V. Site Organization

Map/Sketch	YES	Site Secured	NA
Perimeter Identified	TBD	Zone(s) of Contamination Identified	YES

EMERGENCY ROUTE

Driving directions to Gritman Medical Center



1. Start out going **EAST** on **W 6th ST** toward **S ALMON ST**. 0.10 miles
2. Take the 2nd **RIGHT** onto **S MAIN ST**. 0.07 miles
3. **700 S MAIN ST** is on the **LEFT**.

Total Travel Estimates: about 1 minute / 0.21 miles

ATTACHMENT 1

HEALTH AND SAFETY PLAN ACCEPTANCE FORM

HEALTH AND SAFETY PLAN ACCEPTANCE FORM

PROPERTY SAMPLING ACTIVITIES

I, ___________________________________, have read, understand, and agree to abide by all requirements of the Site Health and Safety Plan (HSP) for Sharpe Oil Sampling Activities.

I understand that my failure to abide by any aspect of the HSP can lead to disciplinary action, including immediate permanent removal from the project.

____   ______________________________

Signature   Date

ATTACHMENT 2

INCIDENT RESPONSE REPORT

Today's Date:	Employee:
Incident Date:	Medical Care provided? ☐Yes ☐No
Incident Time: ☐am/☐pm	Filled out by:

A. Incident/Near Miss Report

<u>This side to be filled out by employee and supervisor/HR/H&S Representative</u>

Name of individual(s) involved:

Location of incident: (TG office building and room, or address and general description)

Description of task being performed, related to what project? (If applicable)

Description of incident: (What events occurred, etc.?)

Part(s) of body injured: (If applicable)

Description of medical care or first aid received: (List health care provider)

Potential cause(s) of incident: (Describe equipment or items contributing to incident.)

Action(s) taken or proposed to reduce chance of reoccurrence:

Incident Category: ☐ Injury ☐ Non-Injury ☐ Near-Miss
☐ Property Damage ☐ Exposure to Hazardous Substance
☐ Other:________________________________

Incident Severity: ☐ First Aid Only ☐ Minor medical ☐ Serious
☐ No lost time ☐ Lost Time ☐ Hospitalized

Employee signature: ____

Supervisor printed name and signature:_______________________________________

Employee:	Supervisor:
Incident date:	Incident time:
H&S/HR rep.:	Date this form completed:

B. ADDITIONAL INFORMATION/DOCUMENTATION - INTERNAL

This side to be completed by H&S or HR representative

1. Is external report required? ☐ Yes ☐ No
   Has this report been made? ☐ Yes ☐ No.
   If so, to whom was report made? (Name and agency) ________________________

2. Were training requirements for the job met? ☐Yes ☐No

3. Was protective equipment used or were protective measures being taken? ☐Yes ☐No
   Describe:

4. Were safety procedures being followed? ☐ Yes ☐ No
   Which ones?

5. Was employee working alone? ☐ Yes ☐ No
   If no, who was present?

6. Witness Interviews: (name of witness; date and time; add extra sheet if needed)

7. Hazards Identified:

8. Other Comments:

9. Recommendations:

10. Recommendations Approved: ☐ Yes ☐ No
    By: ______________________________________ Date: _____________________

11. **Follow up** after ☐days/ ☐ weeks. Update provided to client? ☐ Yes ☐ No
    New status (if changed):

ATTACHMENT 3

TAILGATE MEETING REPORT

Tailgate Meeting Report

Date of Meeting:________________________________

Company Name:___________________________________

Names of Attendees:

____
____
____
____
____
____
____

Discussion Items:

____
____
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____
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Problem Areas, Issues, or Concerns:

____
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____

Corrective Actions Taken:

____
____
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____
____

Signature: ______________________________________

Appendix B

Laboratory Analytical Detection Limits and IDEQ REM Initial Default Target Limits (IDTLs), IDEQ Petroleum Rule Residential Use Screening Levels (RUSLs)

Soil Method Detection Limits, Practical Quantitation Limits, Idaho Initial Default Target Levels, and Residental Use Screening Level

EPA 200.8/6020/7471A metals	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
Arsenic 200.8/6020A	0.1	0.5	0.3906407	#N/A
Barium 200.8/6020A	0.1	0.5	895.63938	#N/A
Cadmium 200.8/6020A	0.1	0.5	1.3528475	#N/A
Chromium 200.8/6020A	0.1	0.5	2130	#N/A
Lead 200.8/6020A	0.1	0.5	49.618955	#N/A
Mercury 200.8/7471A	0.05	0.1	0.0050945	#N/A
Selenium 200.8/6020A	0.1	0.5	2.0341801	#N/A
Silver 200.8/6020A	0.1	0.5	0.1885437	#N/A
EPA 8270C PAH	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
2-Methylnaphthalene	0.005	0.1	3.31	#N/A
Acenaphthene	0.005	0.1	52.264318	52.3
Acenaphthylene	0.005	0.1	78.016833	#N/A
Anthracene	0.005	0.1	1040.1188	1040
Benzo(ghi)perylene	0.005	0.1	#N/A	#N/A
Benzo(a)anthracene	0.005	0.1	0.4216897	0.422
Benzo(a)pyrene	0.005	0.1	0.0421671	0.0422
Benzo(b)fluoranthene	0.005	0.1	0.4215305	0.422
Benzo(k)fluoranthene	0.005	0.1	4.2175927	4.22
Chrysene	0.005	0.1	33.366107	33.4
Dibenz(a,h)anthracene	0.005	0.1	#N/A	#N/A
Fluoranthene	0.005	0.1	363.51173	364
Fluorene	0.005	0.1	54.836079	54.8
Indeno(1,2,3-cd)pyrene	0.005	0.1	0.4218704	#N/A
Naphthalene	0.005	0.1	1.1440039	#N/A
Phenanthrene	0.005	0.1	79.042032	#N/A
Pyrene	0.005	0.1	359.21544	359
EPA 8260B IDTL VOC	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
1,2,4-Trimethylbenzene	0.001	0.005	0.1930065	#N/A
1,2-Dibromoethane	0.0001	0.001	0.0001432	0.00014318
1,2-Dichloroethane	0.001	0.005	0.0076713	0.00771
1,3,5-Trimethylbenzene	0.001	0.005	0.1452871	#N/A
Benzene	0.001	0.005	0.0177853	0.0178
Ethylbenzene	0.001	0.005	10.2	0.071
m+p-Xylene	0.002	0.01	1.67	1.68
methyl-t-butyl ether (MTBE)	0.001	0.005	0.0363772	0.067
Naphthalene	0.001	0.005	1.1440039	0.078
o-Xylene	0.001	0.005	1.67	1.68
Toluene	0.001	0.005	4.8851556	4.89

EPA 8151A HERBS	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
Dalapon	0.005	0.01	#N/A	#N/A
Dicamba	0.005	0.01	#N/A	#N/A
Dichloroprop	0.005	0.01	#N/A	#N/A
2,4Dichlorophenoxyacetic acid (2,4-D)	0.005	0.01	1.8416771	#N/A
Pentachlorophenol	0.005	0.01	0.0090734	#N/A
2,4,5-TP (Silvex)	0.005	0.01	2.37	#N/A
2,4,5-T	0.005	0.01	#N/A	#N/A
2,4-DB	0.005	0.01	#N/A	#N/A
2,4Dinitro-6-sec-butylphenol (Dinoseb)	0.005	0.01	0.1626183	#N/A
Dacthal	0.005	0.01	15.783411	#N/A
Picloram	0.005	0.01	2.9513598	#N/A
Chloramben	0.005	0.01	#N/A	#N/A
EPA 8081A OC PEST	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
alpha-BHC	0.005	0.01	2.10E-04	#N/A
gamma-BHC (Lindane)	0.005	0.01	8.96E-04	#N/A
beta-BHC	0.005	0.01	7.51E-04	#N/A
delta-BHC	0.005	0.01	#N/A	#N/A
Heptachlor	0.005	0.01	0.0010556	#N/A
Aldrin	0.005	0.01	0.0210975	#N/A
Heptachlor epoxide	0.005	0.01	0.0260914	#N/A
4,4-DDE	0.005	0.01	1.7221	#N/A
Endosulfan I	0.005	0.01	2.4926	#N/A
Dieldrin	0.005	0.01	0.001333	#N/A
Endrin	0.005	0.01	0.3350926	#N/A
4,4-DDD	0.005	0.01	2.4386	#N/A
Endosulfan II	0.005	0.01	2.4926	#N/A
4,4-DDT	0.005	0.01	0.403	#N/A
Endrin aldehyde	0.005	0.01	0.3351	#N/A
Methoxychlor	0.025	0.05	55.20219	#N/A
Endosulfan sulfate	0.005	0.01	2.4926	#N/A
Endrin ketone	0.005	0.01	0.3351	#N/A
Chlordane	0.025	0.05	1.5274851	#N/A
Toxaphene	0.025	0.05	0.3257701	#N/A

EPA 8270Cmod OP PESTS	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
Azinphos-methyl	0.05	0.1	#N/A	#N/A
Bolstar	0.05	0.1	#N/A	#N/A
Carbophenothion	0.05	0.1	#N/A	#N/A
Chlorpyrifos	0.05	0.1	2.8416086	#N/A
Coumaphos	0.05	0.1	#N/A	#N/A
Demeton	0.05	0.1	0.0012862	#N/A
Diazinon	0.05	0.1	#N/A	#N/A
Dichlorvos	0.05	0.1	#N/A	#N/A
Dimethoate	0.05	0.1	#N/A	#N/A
Disulfoton	0.05	0.1	0.0667801	#N/A
EPN	0.05	0.1	#N/A	#N/A
Ethoprop	0.05	0.1	#N/A	#N/A
Ethyl parathion	0.05	0.1	#N/A	#N/A
Fensulfothion	0.05	0.1	#N/A	#N/A
Fenthion	0.05	0.1	#N/A	#N/A
Malathion	0.05	0.1	#N/A	#N/A
Merphos	0.05	0.1	#N/A	#N/A
Methyl parathion	0.05	0.1	#N/A	#N/A
Mevinphos	0.05	0.1	#N/A	#N/A
Naled	0.05	0.1	#N/A	#N/A
Phorate	0.05	0.1	#N/A	#N/A
Phosmet	0.05	0.1	#N/A	#N/A
Ronnel	0.05	0.1	#N/A	#N/A
Stirophos	0.05	0.1	#N/A	#N/A
Sulfotep	0.05	0.1	#N/A	#N/A
Tokuthion	0.05	0.1	#N/A	#N/A
Trichloronate	0.05	0.1	#N/A	#N/A
SM4500 NO3	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
NO3/N+NO2/N	1	5	#N/A	#N/A
SM4500NH3G	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
Ammonia/N	0.1	0.5	#N/A	#N/A
SM4500NorgC	MDL Soil mg/Kg	PQL Soil mg/Kg	IDTL mg/Kg	RUSL mg/Kg
TKN	10	25	#N/A	#N/A

Reporting limits for soil and groundwater will meet or be less than the IDEQ REM IDTLs (IDEQ, 2004) and/or IDEQ petroleum rule
IDTL and/or RUSL concentrations presented in orange font are below the practical quantitation limit (PQL).
IDTL and/or RUSL concentrations presented in red font are below the method detection limit (MDL).

TerraGraphics will request that the laboratory report detection of these compounds below the PQL and, although the MDL may be above the IDTL, any detection of these compounds will be utilized to indicate that additional evaluation is warranted. Note that laboratory test results reported between the MDL and PQL will be qualified by the analytical laboratory, and will be considered of acceptable quality for the above compounds given the current analytical methods limitations for these chemicals

Groundwater Method Detection Limits, Practical Quantitation Limits, Idaho Initial Default Target Levels, and Residental Use Screening Level

EPA 200.8/6020/7471A metals	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
Arsenic 200.8/6020A	0.0001	0.001	0.01	#N/A
Barium 200.8/6020A	0.0001	0.001	2	#N/A
Cadmium 200.8/6020A	0.0001	0.001	0.005	#N/A
Chromium 200.8/6020A	0.0001	0.001	0.1	#N/A
Lead 200.8/6020A	0.0001	0.001	0.015	#N/A
Mercury 200.8/7471A	0.00005	0.0001	0.002	#N/A
Selenium 200.8/6020A	0.0001	0.001	0.05	#N/A
Silver 200.8/6020A	0.0001	0.001	0.052142857	#N/A
EPA 8270C PAH	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
2-Methylnaphthalene	0.000005	0.0001	0.0417	#N/A
Acenaphthene	0.000005	0.0001	0.625714286	0.626
Acenaphthylene	0.000005	0.0001	0.625714286	#N/A
Anthracene	0.000005	0.0001	3.128571429	3.13
Benzo(g,h,i)perylene	0.000005	0.0001	0.312857143	#N/A
Benzo(a)anthracene	0.000005	0.0001	7.65255E-05	0.0000765
Benzo(a)pyrene	0.000005	0.0001	0.0002	0.0002
Benzo(b)fluoranthene	0.000005	0.0001	7.65255E-05	0.0000765
Benzo(k)fluoranthene	0.000005	0.0001	0.000765255	0.000765
Chrysene	0.000005	0.0001	0.007652554	0.00765
Dibenzo(a,h)anthracene	0.000005	0.0001	7.65255E-06	#N/A
Fluoranthene	0.000005	0.0001	0.417142857	0.417
Fluorene	0.000005	0.0001	0.417142857	0.417
Indeno(1,2,3-cd)pyrene	0.000005	0.0001	7.65255E-05	#N/A
Naphthalene	0.000005	0.0001	0.208571429	#N/A
Phenanthrene	0.000005	0.0001	0.312857143	#N/A
Pyrene	0.000005	0.0001	0.312857143	0.313
EPA 8260B IDTL VOC	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
1,2,4-Trimethylbenzene	0.0000001	0.000001	0.439	#N/A
1,2-Dibromoethane	0.00000005	0.00000005	0.00005	0.00005
1,2-Dichloroethane	0.0000001	0.000001	0.005	0.005
1,3,5-Trimethylbenzene	0.0000001	0.000001	0.304	#N/A
Benzene	0.0000001	0.000001	0.005	0.005
Ethylbenzene	0.0000001	0.000001	0.7	0.107
m+p-Xylene	0.0000002	0.000002	4.34	4.46
methyl-t-butyl ether (MTBE)	0.0000001	0.000001	0.016928377	0.031
Naphthalene	0.0000001	0.000001	0.208571429	0.102
o-Xylene	0.0000001	0.000001	4.34	4.46
Toluene	0.0000001	0.000001	1	1
EPA 8151A HERBS	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
Dalapon	0.00005	0.0001	0.2	#N/A
Dicamba	0.00005	0.0001	#N/A	#N/A
Dichloroprop	0.00005	0.0001	#N/A	#N/A
2,4-D	0.00005	0.0001	0.104285714	#N/A
Pentachlorophenol	0.00005	0.0001	0.001	#N/A
2,4,5-TP (Silvex)	0.00005	0.0001	0.05	#N/A
2,4,5-T	0.00005	0.0001	#N/A	#N/A
2,4-DB	0.00005	0.0001	#N/A	#N/A
Dinoseb	0.00005	0.0001	0.007	#N/A
Dacthal	0.00005	0.0001	0.104285714	#N/A
Picloram	0.00005	0.0001	0.5	#N/A
Chloramben	0.00005	0.0001	#N/A	#N/A

EPA 8081A OC PEST	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
alpha-BHC	0.000002	0.00001	0.00000887	#N/A
gamma-BHC (Lindane)	0.000001	0.00001	0.000043	#N/A
beta-BHC	0.000002	0.00001	0.000031	#N/A
delta-BHC	0.000002	0.00001	#N/A	#N/A
Heptachlor	0.000003	0.00001	0.0004	#N/A
Aldrin	0.000005	0.00001	3.2861E-06	#N/A
Heptachlor epoxide	0.000008	0.00001	0.0002	#N/A
4,4-DDE	0.000004	0.00001	0.000164305	#N/A
Endosulfan I	0.000002	0.00001	0.062571429	#N/A
Dieldrin	0.000003	0.00001	3.49148E-06	#N/A
Endrin	0.000002	0.00001	0.002	#N/A
4,4-DDD	0.000001	0.00001	0.000232765	#N/A
Endosulfan II	0.000003	0.00001	0.062571429	#N/A
4,4-DDT	0.000004	0.00001	0.000164305	#N/A
Endrin aldehyde	0.000001	0.00001	0.002	#N/A
Methoxychlor	0.000005	0.00001	0.04	#N/A
Endosulfan sulfate	0.000004	0.00001	0.062571429	#N/A
Endrin ketone	0.000004	0.00001	0.002	#N/A
Chlordane	0.000025	0.00005	0.002	#N/A
Toxaphene	0.000025	0.00005	0.003	#N/A
EPA 8270Cmod OP PESTS	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
Azinphos-methyl	0.0001	0.0005	#N/A	#N/A
Bolstar	0.0001	0.0005	#N/A	#N/A
Carbophenothion	0.0001	0.0005	#N/A	#N/A
Chlorpyrifos	0.0001	0.0005	0.031285714	#N/A
Coumaphos	0.0001	0.0005	#N/A	#N/A
Demeton	0.0001	0.0005	0.000417143	#N/A
Diazinon	0.0001	0.0005	#N/A	#N/A
Dichlorvos	0.0001	0.0005	#N/A	#N/A
Dimethoate	0.0001	0.0005	#N/A	#N/A
Disulfoton	0.0001	0.0005	0.000417143	#N/A
EPN	0.0001	0.0005	#N/A	#N/A
Ethoprop	0.0001	0.0005	#N/A	#N/A
Ethyl parathion	0.0001	0.0005	#N/A	#N/A
Fensulfothion	0.0001	0.0005	#N/A	#N/A
Fenthion	0.0001	0.0005	#N/A	#N/A
Malathion	0.0001	0.0005	#N/A	#N/A
Merphos	0.0001	0.0005	#N/A	#N/A
Methyl parathion	0.0001	0.0005	#N/A	#N/A
Mevinphos	0.0001	0.0005	#N/A	#N/A
Naled	0.0001	0.0005	#N/A	#N/A
Phorate	0.0001	0.0005	#N/A	#N/A
Phosmet	0.0001	0.0005	#N/A	#N/A
Ronnel	0.0001	0.0005	#N/A	#N/A
Stirophos	0.0001	0.0005	#N/A	#N/A
Sulfotep	0.0001	0.0005	#N/A	#N/A
Tokuthion	0.0001	0.0005	#N/A	#N/A
Trichloronate	0.0001	0.0005	#N/A	#N/A
SM 4500 NO3	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
NO3/N+NO2/N	0.00001	0.00005	10	#N/A
SM 4500 NH3G	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
Ammonia/N	0.00001	0.00005	#N/A	#N/A
SM 4500 NorgC	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
TKN	0.0001	0.0002	#N/A	#N/A
SM 4500 PF	MDL Water mg/L	PQL Water mg/L	IDTL mg/L	RUSL mg/L
Total Phosphorus	0.005	0.01	#N/A	#N/A

Reporting limits for soil and groundwater will meet or be less than the IDEQ REM IDTLs (IDEQ, 2004) and/or IDEQ petroleum rule RUSLs (IDEQ, 2011).

IDTL and/or RUSL concentrations presented in orange font are below the practical quantitation limit (PQL).

IDTL and/or RUSL concentrations presented in red font are below the method detection limit (MDL).

TerraGraphics will request that the laboratory report detection of these compounds below the PQL and, although the MDL may be above the IDTL, any detection of these compounds will be utilized to indicate that additional evaluation is warranted. Note that laboratory test results reported between the MDL and PQL will be qualified by the analytical laboratory, and will be considered of acceptable quality for the above compounds given the current analytical methods limitations for these chemicals