Circle S Grocery, Monitoring Well Installation Work Plan

Chugiak, Alaska

ADEC File No. 2106.26.004

ADEC Hazard ID 24797

BSUM Claim #105081

ERM Project #0313526

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ACRONYMS AND ABBREVIATIONS

%..... percent
AAC..... Alaska Administrative Code
ADEC ..... Alaska Department of Environmental Conservation
bgs..... below ground surface
BSUM..... Berkley Specialty Underwriting Managers
BTEX..... benzene, toluene, ethylbenzene and xylene
COPC..... contaminant of potential concern
CSM ..... conceptual site model
DQO..... data quality objectives
DRO..... diesel range organics
DTH ..... down-the-hole
EMI ..... Environmental Management, Inc.
ERM..... ERM Alaska, Inc.
GRO..... gasoline range organics
mg/kg ..... milligrams per kilogram
MOA..... Municipality of Anchorage
MCL..... maximum contaminant levels
NRC..... NRC Alaska, LLC
PID..... photoionization detector
PPE..... personal protective equipment
ppm..... parts per million
QA..... quality assurance
QC..... quality control
RPD..... relative percent difference
SCL..... soil cleanup level
SGS..... SGS North America, Inc.
SS..... soil sample
SSC..... subsurface clearance
the Site..... Circle S Grocery, 22189 Birchwood Loop Road, Chugiak, Alaska
USEPA..... U.S. Environmental Protection Agency
UST ..... underground storage tank

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1. INTRODUCTION

ERM Alaska, Inc. (ERM) is submitting this work plan to Berkley Specialty Underwriting Managers (BSUM) to continue an environmental site investigation at the Circle S Grocery (the Site) located at 22189 Birchwood Loop Road, Chugiak, Alaska (Figure 1), Alaska Department of Environmental Conservation (ADEC) File Number 2106.26.004, Hazard ID 24797. The current property owner is Ms. Pomposa Porterfield. This work plan was prepared to describe the installation of three monitoring wells and follow-on well development and sampling, as requested by the ADEC in a 7 April 2015 letter from Mr. Robert Weimer. This work is being done in an effort to determine the horizontal extent of impact at the Site.

1.1. Site Background

Chugiak is located in southcentral Alaska, approximately 20 miles north of Anchorage, as shown in Figure 1. Chugiak is part of the Municipality of Anchorage (MOA), located between the communities of Eagle River and Eklutna. Chugiak was first settled in the 1950s, primarily by former military personnel who had served in Alaska during World War II who homesteaded in the area. There are approximately 8,300 year-round residents in Chugiak.

Circle S Grocery previously operated a gas station and a small convenience store at the site (Figure 2). In June 1995, two underground storage tanks (UST), a 10,000-gallon gasoline UST and a 5,000-gallon diesel UST, were removed from the site. The soil beneath the USTs was impacted with fuel and some of the impacted soil was excavated at the time of the UST removals. According to the 1995 *UST Permanent Closure Site Assessment Report* (New Horizons Telecom, Inc. 1995), not all of the impacted soil was excavated, and the excavation area was lined with a fuel resistant liner before the installation of a replacement UST. The closure report stated that the 5,000-gallon diesel UST was used to store gasoline until 1994, when the product was switched to diesel. These tanks were replaced by an 11,000-gallon dual compartment tank in 1995, which held both gasoline and diesel fuel for the gas station's fuel sales until the store's closing. In August 2012, the dual compartment UST was removed (reported as 15,000 gallons in the UST removal report; Environmental Management, Inc. [EMI] 2012).

Soil sampling was performed during the 1995 and 2012 UST removal actions, and a limited site investigation was conducted in 1999 to characterize fuel releases from the USTs. The reports documenting these activities indicate that petroleum hydrocarbons remain in the soil at the site at concentrations that exceed the State of Alaska cleanup levels. In June 2013, the ADEC sent a letter to Ms. Porterfield that outlined the State of Alaska regulations concerning contaminated sites and responsibilities as a landowner (ADEC 2013a). The letter requested that a work plan be developed to define the nature and extent of the remaining contamination, and submitted to the ADEC.

Soils in the immediate vicinity of the UST were reportedly mostly pea gravel (EMI 2012). The soils surrounding the pea gravel consisted of brown sandy silt with gravel. No groundwater was encountered during either the 1995 or the 2012 UST removal actions. Groundwater levels are reported to be greater than 70 feet below ground surface (bgs) in the Chugiak, Alaska area.

1.2. Previous Investigations

In 1995, the USTs were emptied of fuel prior to removal (New Horizons Telecom, Inc. 1995). The final excavation measured 22 feet by 37 feet by 16 feet deep. Fuel-contaminated soil was encountered throughout the excavation to a depth of 15 feet bgs Field screening performed during tank removal indicated high levels of petroleum contamination (New Horizons Telecom, Inc. 1995). Laboratory analysis of soil samples collected from the bottom of the excavation indicated that remaining soil was impacted above applicable ADEC-cleanup levels with petroleum hydrocarbons. A fuel resistant liner was placed in the excavation prior to the installation of a new UST and clean backfill.

In August 1999, a limited site investigation was conducted to characterize the extent of petroleum hydrocarbon impacts to the subsurface at the site (TELLUS Ltd. 1999a). Two soil boreholes were advanced to approximately 67 feet bgs. Laboratory results of soil samples collected from the boreholes indicated that benzene and gasoline range organics (GRO) concentrations exceeded the ADEC soil cleanup levels (SCL) found in *Title 18 of the Alaska Administrative Code* (AAC), *Chapter 75* (18 AAC 75), *Oil and Other Hazardous Substances Pollution Control* (ADEC 2015a). Although no groundwater was encountered in the boreholes, groundwater monitoring wells were installed. The monitoring wells were checked in September 1999 and no groundwater was detected in the wells (TELLUS Ltd. 1999b).

In August 2012, the dual compartment UST was removed. The excavation conducted to remove the UST did not extend past the liner placed in 1995, when the tank was installed. Laboratory results for soil samples collected from the excavation bottom indicated that benzene and diesel-range organics (DRO) exceeded the ADEC 18 AAC 75 SCLs (EMI 2012). Soil removed from the excavation was stockpiled and sampled. Review of results for the soil stockpile samples indicated that this soil was not impacted above the ADEC SCLs. The closure report did not state what material was used to backfill the excavation.

In January 2014, ERM advanced three boreholes in the vicinity of the former USTs. Two were advanced to a depth of 26 feet below grade, while the third borehole, BH-01, was advanced to 82 feet in an effort to investigate the aquifer, in which the on-site drinking water well is completed. On-site interpretation of field screening readings taken at depth in borehole BH-1 indicated that volatile contaminant concentrations at 80 feet bgs would likely be below applicable soil cleanup levels. Consequently, the borehole was terminated before groundwater was encountered, and a monitoring well was not

installed. However, analytical results for the sample collected from borehole BH-1 at 80 to 82 feet bgs document that benzene is present in the soil at concentrations in excess of the migration-to-groundwater soil cleanup level. With the exception of the sample collected from borehole BH-1 at the 14 to 16 feet bgs interval, there were no exceedances of applicable ADEC soil cleanup levels in soils above the liner, which was installed at a depth of approximately 15 to 16 feet bgs (New Horizons Telecom, Inc. 1995).

The on-site drinking water well at 22179 Birchwood Loop Road has been sampled on a monthly basis since 2014. Review of results indicates that some of the benzene, toluene, ethylbenzene and xylenes (BTEX) constituents are present in the groundwater produced from this well. Review of the April through August 2015 analytical results indicates the presence of trace amounts of benzene, ethylbenzene and total xylenes in the drinking water at the residence. None of the analytes detected in project samples exceeded their applicable maximum contaminant levels (MCL). In addition, no analytes were detected in the neighboring well at 22208 Birchwood Loop Road (April 2015 sample). Monthly drinking water sampling at the on-site residence is planned through March 2016.

1.3. Project Objective

The primary objective of this project is to delineate the horizontal extent of groundwater impact in the vicinity of the former USTs and on-site drinking water well. In a letter dated 7 April 2015, the ADEC (ADEC 2015) requests that the groundwater impact at the property be further characterized, even though there have been no detections of BTEX constituents above water quality criteria (MCLs) in samples from the on-site well. The scope of work includes installation of three monitoring wells to confirm groundwater flow direction and assess any impacts to the drinking water aquifer down-gradient from the former USTs location.

Although the 7 April 2015 letter calls for a vertical characterization of contamination, no soil sampling is planned at this time, as discussed between the ADEC (Robert Weimer) and ERM (Max Schwenne) in a telephone conversation 17 April 2015. Priority should be given to drinking water and monitoring well sampling. Additional soil sampling may be required in the future to characterize impacts and determine the extent of contamination.

1.4. Contaminants of Potential Concern

The contaminants of potential concern (COPC) at the site are volatile organic compounds associated with gasoline and diesel fuel. As the original sources are gone, and a significant portion of the secondary source has also been removed, it is assumed that the contaminant concentrations present at the property are stable or decreasing.

1.5. Conceptual Site Model

The conceptual site model (CSM) for the site was developed by ERM using the results of the 2014 site investigation (ERM 2014) and ADEC's *Policy Guidance on Developing*

Conceptual Site Models (ADEC 2010c). A copy of the CSM is provided in Appendix A. The CSM conservatively assumes that there are completed exposure pathways between remaining contamination identified in site soils and future site receptors through incidental soil ingestion and inhalation of outdoor air. Additional assessment of the potential exposure pathways for current and future residents through ingestion, dermal absorption and inhalation of contaminants present in groundwater is needed to fully ascertain whether or not these pathways are complete. The detection of low levels of BTEX constituents in the on-site drinking water well indicates a pathway may be complete for groundwater. The CSM conservatively assumes that these groundwater exposure pathways are complete; however, given the depth to groundwater and the observed contaminant concentrations at depth and in water from the on-site well, exposure is likely to be insignificant. The CSM human health scoping form and graphical form are included in Attachment 2. The data obtained from this project will be used to update the CSM for the site.

1.6. Regulatory Framework

The regulatory framework for this project was developed using the following regulations and guidance documents:

- 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2015a).
- 18 AAC 78, *Underground Storage Tanks* (ADEC 2015b).
- 18 AAC 80, *Drinking Water* (ADEC 2014).
- ADEC, *Monitoring Well Guidance* (ADEC 2013)
- ADEC *Policy Guidance on Developing Conceptual Site Models* (ADEC 2010c).
- ADEC *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites* (ADEC 2009b).
- ADEC *Draft Field Sampling Guidance* (ADEC 2010b).

Water samples collected as part of this investigation will be submitted to the project laboratory for the analysis using Alaska Methods AK 101 for Gasoline Range Organics (GRO)/Benzene, Ethylbenzene, Toluene, & Xylenes (BTEX) and, AK 102/103 for Diesel Range Organics/Residual Range Organics (DRO/RRO).

2. SCOPE OF WORK

The scope of work for this project includes the installation of three groundwater monitoring wells at the subject site, the development of each well, and the quarterly sampling of the wells in accordance with this work plan. The installation of the monitoring wells is scheduled for October 2015, followed by quarterly groundwater sampling. Field work consists of the following work elements:

- Verify there are no subsurface conflicts at the proposed monitoring well locations, and adjust locations in the field, as required, to avoid potential conflicts.
- Advance three soil boreholes at the site to enable installation of three groundwater monitoring wells. The proposed borehole/well depth is 120 feet below grade, and this depth is estimated based on the static water level in the on-site drinking water well (110 feet bgs). Monitoring well positioning was determined based on the source location (former USTs), the expected groundwater flow direction (northerly, give or take 45 degrees), and the location of the on-site drinking water well and the closest neighboring drinking water well at 2211 McKinley View (Figure 2).
    - One borehole will be advanced within the excavation (MW-01).
    - One borehole will be advanced about 60 feet to the northeast of the former excavation (MW-02).
    - One borehole will be advanced about 60 feet northeast of the former excavation (MW-03).
- Install 2-inch outside-diameter groundwater monitoring wells in each of the boreholes, with at least 20 feet of screened interval.
- Develop each of the groundwater monitoring wells.
- Sample each of the monitoring wells after development.
- Quarterly groundwater sampling: October 2015, and January, April and July 2016.

2.1. Pre-Investigation Activities

Before conducting site investigation activities, ERM will coordinate site access with Ms. Porterfield. ERM will notify the ADEC project manager (Mr. Robert Weimer or alternate designated by Mr. Weimer) a minimum of 72 hours prior to conducting the field investigation. Additional pre-investigation activities will be performed as described in the subsections that follow.

2.1.1. *Utility Locates and Subsurface Clearance*

Before conducting ground disturbance activities, ERM will take steps to prevent damage to subsurface utilities by strict adherence to our rigorous subsurface clearance (SSC) process. Ryan Burich or Joe Casey will be the SSC "Experienced Person" for this project. Prior to conducting any drilling work, ERM will provide the locations of the proposed boreholes to Ms. Porterfield or her authorized representative. The locations will be reviewed, and any infrastructure identified. The presence or absence of all known or suspected subsurface services, such as water, sewer, electric, natural gas, storm drains and communication lines, will be identified prior to invasive site work. An ERM SSC Field Process Checklist (Appendix B), an internal requirement, will be completed for the three proposed borehole/monitoring well locations.

The SSC Experienced Person will perform a site walk with Ms. Porterfield or her representative for a visual survey of the proposed borehole/monitoring well locations to identify signs of potential underground obstructions and utilities. Underground utilities in the vicinity of the proposed borehole locations will be located using the Alaska DIGLINE public utility location service (1-907-278-3121). ERM will obtain a State of Alaska utility locate ticket for the site to identify any service tie-in locations from the utility main lines located along the streets bordering the site. A private utility locator, Gumfry Underground, will be used to locate the utilities at the site, as appropriate.

If the proposed borehole locations are within a critical zone (*i.e.*, within 10 feet of a suspected or known utility or infrastructure), every effort will be made to move the proposed borehole locations outside of the critical zone. If moving a proposed borehole location is not possible, ERM will physically clear the location to 5 feet bgs, and possibly up to 10 feet bgs using hand tools or a vacuum truck (likely coupled with a "water knife") to verify the presence or absence of subsurface utilities. Physical clearance will be performed by our drilling subcontractor, GeoTek Alaska, Inc. If physical clearance is necessary, the extracted soil will be field screened with a PID. If field observations indicate contamination, the soils will be disposed of following review and approval by ADEC.

2.1.2. *Overhead Utility Clearance*

Overhead utilities are present at the site in the vicinity of at least one of the proposed borehole locations. ERM will confirm overhead clearances with the drilling subcontractor to ensure safe deployment of the drill rig to the proposed borehole locations. Proximity alarms and/or spotters will be used to ensure safe distances. Steps will be taken to ensure that the minimum distance from any point on the drill rig to the nearest overhead electrical power line will adhere to the minimum clearance requirements specified by the utility companies. As an example, for lines rated at 50,000 volts (50 kilovolts) or less, the minimum distance between the energized lines and any part of the drill rig should be at least 10 feet. If the minimum clearance requirement

cannot be adhered to, the proposed borehole location(s) will be moved to meet this requirement.

2.1.3. Subcontractor Coordination

Drilling will be coordinated with the drilling subcontractor, GeoTek Alaska, Inc. of Anchorage, Alaska, and sample kits will be obtained from the project laboratory, SGS North America, Inc. (SGS) of Anchorage, Alaska, prior to commencing the investigation.

2.2. Borehole Installation

A total of three soil boreholes will be advanced at the Circle S Grocery site, at the locations shown on the attached map (Figure 2). As indicated above, the boreholes will be advanced to approximately 120 feet bgs. If water (saturated cuttings) are not been observed at this depth, each borehole will be advanced in increments of 10 feet until evidence of a water-saturated zone is observed. Maximum anticipated borehole depth is 150 feet, which is approaching the depth capability of the proposed drilling rig.

The boreholes will be advance using a Geoprobe 8040 unit (or similar) equipped with air rotary down-the-hole hammer (DTH) capability. This method creates a 4.5-inch diameter borehole by advancing casing of that diameter, with an inner drill rod attaching to the DTH hammer at the leading end of the drill string. Air is circulated under up to 150 pounds per square inch pressure, and up to 350 standard cubic feet per minute flow to operate the hammer and circulate cuttings up the annulus between the inner drill rod and the outer casing.

Cuttings will be circulated to the ground surface. At the source borehole (MW-01), the cuttings will be captured for off-site management at the MOA Regional Landfill. A representative soil sample will be collected from the cuttings recovered from this borehole. This sample will be submitted for laboratory analysis to verify the soil meets the MOA Landfill disposal requirements. Alternatively, available 2014 investigation sample results may be used for characterization, if MOA finds these results acceptable pending ADEC review and approval.

Cuttings from the other two boreholes (MW-02 and MW-03), which are not anticipated to be contaminated, will be checked with a photoionization detector (PID). A representative heated headspace sample will be collected from each borehole's cuttings and tested at the site. If the heated headspace PID result does not have elevated readings and there is no visible field observations for impact, the material will be spread on site, provided approval is received from Ms. Porterfield. If field observations do indicate contamination, the soils will be managed as described above.

The soil cuttings that circulate up-hole will be logged by ERM solely through observations of drill cuttings. This information will be recorded in the field and later incorporated into the borehole log at the time of reporting, which will contain a schematic drawing of each soil borehole. The field record and borehole log will include the following information:

- Date drilled
- Type of equipment used
- The names of the logger and driller
- Soil descriptions and depths

ERM advises that soil descriptions will be general because the DTH hammer pulverizes material, and it can be difficult to distinguish soil types based on the material circulated to the ground surface.

2.3. Monitoring Well Installation

After advancing each borehole to a depth approximately 10 feet below the first-encountered water-saturated interval (the top of this interval is expected at about 110 feet below grade), a monitoring well will be installed. Monitoring well installation and construction will follow ADEC's *Monitoring Well Guidance* (ADEC 2013b). The monitoring wells will be constructed with 2-inch diameter Schedule-40 polyvinylchloride casing with a minimum 20-foot screen section (ten feet above and below the water table) of 0.010-inch slotted screen and threaded end cap. The filter pack around the screened interval will be 20/40 rounded silica sand held in place by a stainless steel mesh screen ("pre-pack" screen), while the sand pack will be around this pre-pack screen and up to 2 feet above the top of the screen using 10/20 silica sand. ERM proposes to place the screen so that it is located in the top 10 feet of the aquifer; note that the water level in a monitoring well may be above the top screen slot if the aquifer is behaving as a confined unit. Since phase-separated product is not expected in any well, this should not affect data quality.

After completing the sand pack, the remainder of the annulus will be filled with bentonite chips, and hydrated in place. Bentonite chip placement and hydration will occur at no more than 20-foot intervals. The well will be completed with a flush-mount locking monument set in asphalt, or at least a few inches below the ground surface if asphalt is not present. A relative vertical elevation survey of the new monitoring wells and Ms. Porterfield's well will be performed once monitoring well installation is complete. This survey, combined with depth-to-water measurements, will be used to determine the groundwater flow direction and gradient. A hand-held global position system unit will be used to obtain accurate location information for the monitoring wells and Ms. Porterfield's well.

2.4. Monitoring Well Development

The monitoring wells will be allowed to sit undisturbed for a minimum of 24 hours following completion. An ERM field team consisting of two people will then mobilize to the site to develop the newly installed wells to ensure proper hydraulic connection to the surrounding aquifer and to allow for free flow of formation water into the well for sampling in accordance with ADEC's *Monitoring Well Guidance* (ADEC 2013a). Either a

submersible pump or surge block will be used for development. The developed wells will be allowed to sit undisturbed for a minimum of 24 hours prior to sampling.

2.5. Monitoring Well Sampling

The monitoring wells will be sampled quarterly for at least 1 year by an ERM field team consisting of two people, with the first sampling event being performed 24 hours after development in accordance with monitoring ADEC Monitoring Well Guidance (expected to be October 2015). The remaining sampling dates are estimated to occur in January, April and July 2016.

Goundwater sampling activities will occur in the following order:

- Depth to groundwater and depth to the bottom of the well will be measured prior to sampling.
- Well purge volume will be calculated. Sampling will be performed using low-flow sampling techniques to minimize drawdown and possible impact to the local aquifer. Given the depth to water (≥110 feet bgs), it is expected that a submersible pump will be required to conduct well purging and sampling. Water quality parameters (pH, conductivity, temperature, at a minimum) will be measured periodically during purging. Groundwater samples will be collected after purging at least one well volume, provided parameters have stabilized (within 10 percent of prior reading).
- The well will be checked for non-aqueous phase liquids
- Groundwater samples will be collected within the top one (1) foot of the water column in the following order:
    - In-field water quality measurements
    - GRO/BTEX
    - DRO/RRO

One duplicate sample will be collected for each sampling event for quality assurance purposes. A trip blank will accompany bottles to the site, and back to the laboratory. SGS will provide analytical laboratory services. Documentation will be provided in the field notes and on sampling sheets that the intake for the submersible pump was placed within one (1) foot of the top of the water column.

2.6. Decontamination

Large pieces of non-disposable drilling equipment such as down-hole hammer, pipe and rods will be decontaminated first by removing visible dirt with a brush. Materials removed from the equipment will be collected and placed with the soil cuttings. The equipment will then be washed with an Alconox™ solution, followed by a double rinse using potable water. Decontamination wash and rinse water will be collected for appropriate disposal.

The submersible pump will be decontaminated similar to drilling equipment, except a third rinse with deionized water will be added after the second potable water rinse. This decontamination wash and rinse water will also be collected for appropriate disposal.

2.7. Investigation-Derived Waste

Investigation-derived waste anticipated to be generated includes soil cuttings, decontamination water, and disposable sampling equipment and personal protective equipment (PPE).

Soil cuttings from the borehole at the source (MW-01), expected to be approximately two tons of cuttings, will be temporarily stockpiled on a liner at the site and covered. A representative sample will be collected to support disposal at the MOA Regional Landfill on Hiland Road, if required. ERM requests that the ADEC approve transport of these cuttings, provided results meet the MOA requirements for contaminated soil (GRO <500 milligrams per kilogram [mg/kg]; DRO <1,000 mg/kg; BTEX <50 mg/kg; and lead <5 mg/kg Toxicity Characteristic Leaching Procedure or 100 mg/kg total lead). Also, a separate ADEC form requesting approval to transport will be submitted for approval.

Cuttings from the two boreholes located more than 150 feet from the source (MW-02 andMW-03) will be evaluated as described in Section 2.2.

Decontamination water will be containerized and disposed through NRC Alaska, LLC (NRC), formerly Emerald Alaska. Purge water will also be containerized, and disposed through NRC.

Disposable sample equipment and PPE will be collected in a garbage bag, taped shut and disposed of as solid waste in the MOA Regional Landfill.

3. QUALITY ASSURANCE AND QUALITY CONTROL

The investigation will be performed in accordance with the quality assurance (QA) and quality control (QC) procedures presented in this section. ERM professional staff will manage and execute the elements of this work plan. Anne Kranawetter will be the project manager. Field efforts will be performed by two ERM engineers/scientists, with at least one team member meeting the definition of "qualified person" as per 18 AAC 75.990(100).

3.1. Project Quality Assurance

Field personnel will collect samples in a manner that preserves the integrity of the sample matrix. Samplers will use certified sample media to prevent cross-contamination between samples. Sampling equipment will be dedicated to each sample location to the extent practical. Sample containers will be sealed, labeled and preserved in accordance with the analytical method. Equipment will be calibrated, maintained and operated according to manufacturer recommendations.

3.1.1. Field Documentation

Field documentation will consist of the use of field logs, sample identification labels and photographs. A field logbook will be maintained by the ERM field team leader to record a description of field activities and samples collected. Corrections will be struck, initialed and dated. Information and observations relevant to monitoring activities will be recorded in the comments section of the appropriate forms and/or in a standard field book.

3.1.2. Sample Identification

Samples collected for laboratory analysis will be identified with a standard sample identification number format. Sample numbers will use the following format: 15-CSG-01-WG-MW01.

Where "15" represents the calendar year; "CSG" represents "Circle S Grocery;"; "01" is a sequential sample number; "WG" is the designator for sample type; and MW01 is the borehole/well designation. Possible sample types for this project are listed below.

- SS – soil sample (if analysis of a soil cuttings sample is needed prior to disposal at the MOA Regional Landfill)
- WG – groundwater sample
- TB – trip blank

3.1.3. Sample Handling

Samples will be tracked by the use of chain-of-custody laboratory forms. Each sample will be individually identified on a chain-of-custody form. These forms will include the

sample identification number, sample date, sample time, requested analysis, type and number of sample containers, QC information and requested analytical turnaround time. Each form will be signed and dated on relinquishment to another party, be it the shipper, courier or laboratory, to maintain the custody of the samples.

3.2. Analytical Procedures

3.2.1. Soil Sampling

Analytical soil samples will be analyzed using the following methods:

- BTEX by USEPA Method 8020 (or equivalent).
- GRO/BTEX by Alaska Test Method 101.
- DRO by Alaska Test Method 102.
- Total lead by USEPA Method 6020.

Below Table 1 presents the analytical program for the soil sampling event at the Circle S Grocery site. If additional sampling is required by the Municipality of Anchorage, one primary representative soil sample will be collected from the soil borehole cuttings stockpile. Laboratory results of soil samples will be compared to the MOA Solid Waste Landfill acceptance criteria.

TABLE 1: LABORATORY ANALYTICAL PROGRAM FOR SOIL SAMPLES

Matrix	Parameters	Analytical Method	Sample Container/ Hold time	Preservation	Number of Primary Samples
Soil	BTEX	USEPA 8020	4-oz Amber glass, Teflon® lined septa/28 days	Methanol/ 4°C	1
Soil	GRO	AK101	4-oz Amber glass, Teflon® lined septa/28 days	Methanol/ 4°C	1
Soil	DRO	AK102	4-oz Amber glass, Teflon® lined cap/14 days	4°C	1
Soil	Total Lead	USEPA 6020	4-oz Amber glass, Teflon® lined cap/180 days	4°C	1

3.2.2. *Water Sampling*

Analytical water samples will be analyzed for BTEX using EPA Method 524.2.

TABLE 2: LABORATORY ANALYTICAL PROGRAM FOR GROUNDWATER SAMPLES

Matrix	Parameters	Analytical Method	Sample Container/ Hold time	Preservation	Number of Primary Samples
Water	GRO/BTEX	AK 101	40-milliliter Volatile Organics Analysis vial	Hydrochloric acid <2/ 4°C	6
Water	DRO/RRO	AK 102/103	250-milliliter Amber glass, septa lid	Hydrochloric acid <2/ 4°C	2

A trip blank will accompany the bottle order from the laboratory for each sampling event.

3.3. Project Quality Control

QC procedures are used to ensure that data are usable for their intended purpose. Specific objectives of the QC program are listed below:

- Samples collected at the site are consistent with project objectives.
- Samples are identified, preserved and transported in a manner such that the data are representative of the actual site conditions.
- Information is not lost in sample transport.
- The data are legally defensible.

Sampling will be performed in accordance with the methods described in Section 2.

3.4. Quality Control Samples

QC samples will be collected and prepared to assess potential errors introduced during sample collection, handling and analysis. As part of the QA/QC program, field duplicate (QC) samples will be collected and analyzed.

One field duplicate sample will be collected for all analyses to verify the reproducibility of data within the project laboratory. The location of the field duplicate will be collected from MW-01. The duplicate sample will be handled, labeled and documented in the same manner as regular field samples to prevent bias in the laboratory results. The field duplicate sample will not be identified, but labeled in the same manner as other field samples on the chain-of-custody forms.

Trip blanks will accompany the sample containers sent into the field from the laboratory. Trip blanks are used when samples are collected for volatile analyses and are included in shipments back to the laboratory that contain samples to be analyzed for volatile compounds.

3.5. Data Quality Objectives

Analytical data quality objectives (DQO) have been established for this project to ensure that the monitoring data is of sufficient quantity and quality to accomplish the following:

- Monitor COPCs for comparison to the ADEC criteria.
- Evaluate the results of the site mitigation activities.
- Ensure the integrity of the results is legally defensible.

The laboratory analytical DQOs accuracy, precision, completeness and reporting limits for the planned soil, water and air sampling activities are as follows:

- Precision (Relative percent [%] differences [RPD]) - less than 50%
- Accuracy (Percent Recovery) – Compared against method standards
- Completeness (Percent) – 95%
- Reporting Limit – below the ADEC SCLs

3.6. Data Reduction, Validation and Reporting

Verification of analytical data will be performed by a qualified professional experienced in data verification/validation procedures. Data will be verified in accordance with the USEPA procedural guidance documents and the ADEC regulatory guidance documents as appropriate. The reference documents include the USEPA *Environmental Data Verification and Validation EPA QA/G-8*, November 2002; the USEPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA-540-R-08-01), June 2008; and the USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA-540-R-10-011), January 2010.

Additionally, the water quality data verification will conform to the ADEC *Environmental Laboratory Data and Quality Assurance Requirements*, Technical Memo-06-2002, dated March 2009 (ADEC 2009a). Laboratory performance and analytical results will be checked through a QA review, which will include the ADEC's *Laboratory Data Review Checklist* (ADEC 2010a). The review will assess analytical quality through five data quality indicators: completeness, accuracy, precision, comparability and representativeness. The impact of any discrepancies will be discussed with respect to the quality and usability of the data.

The following are DQOs for each indicator:

- Completeness – The completeness goal is 85%.
- Accuracy – Surrogate percent recovery will be compared against method standards.

- Precision – A minimum of one duplicate for every ten field samples, for each matrix and target analyte, should be collected; RPDs should be less than 30% for primary and field duplicate samples
- Comparability – Samples will be analyzed for the same parameters using the same sampling and analytical methods to compare data. Reporting limits for samples should be less than the ADEC Drinking Water Standards.
- Representativeness –Trip blank samples will travel with field personnel and will be analyzed to determine if cross-contamination has occurred for BTEX analysis of water samples.

DQOs have been established for this project to ensure that the monitoring data is of sufficient quantity and quality to accomplish the following:

- Monitor contaminant concentrations for comparison to MCLs set forth in 40 Code of Federal Regulations 141.61 (USEPA 2014), as adopted by reference in 18 AAC 80.010(a)(10)(A) (ADEC 2012).
- Evaluate the BTEX concentrations in the drinking water.
- Ensure that the integrity of the results is legally defensible.

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4. SCHEDULE

Pending ADEC-approval of this work plan, we anticipate conducting monitoring well installation, development and sampling activities starting about 13 October 2015. ERM will prepare a draft report detailing the work performed and the findings of this investigation within two weeks of receipt of final laboratory analytical results.

Additional quarterly groundwater monitoring events for Year 1 will be conducted during January, April and July 2016. Data will be tabulated quarterly and provided to ADEC, and a summary report will be provided after the July 2016 sampling event. The need for additional monitoring will be determined in consultation with BSUM and the ADEC at that time.

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5. REPORTING

Data collected during site investigation activities at the Circle S Grocery site will be reported to BSUM and the ADEC in a complete report. ERM will advise BSUM and the ADEC of any deviations from this work plan due to site conditions or unforeseen changes in the project scope. At the end of each quarterly sampling event, ERM will electronically submit to ADEC the laboratory report, QAR, field notes, summary table and groundwater flow determination.

Following the receipt of laboratory data and completion of field activities, ERM will prepare and submit a final comprehensive report that meets requirements of 18 AAC 75.380 for review and approval by BSUM and the ADEC project manager. The report will consist of a narrative, tables, figures, site photographs, laboratory data and a data quality review, which will include the ADEC QA/QC checklist for data quality. Copies of completed field notes will be included in both the draft and final reports.

The draft report will be submitted electronically for BSUM and the ADEC for review and comment. The final report will be revised based on any comments received and hard copies will be submitted to BSUM and the ADEC. A compact disc containing a portable data file of the entire report will be included with the final report hard copy.

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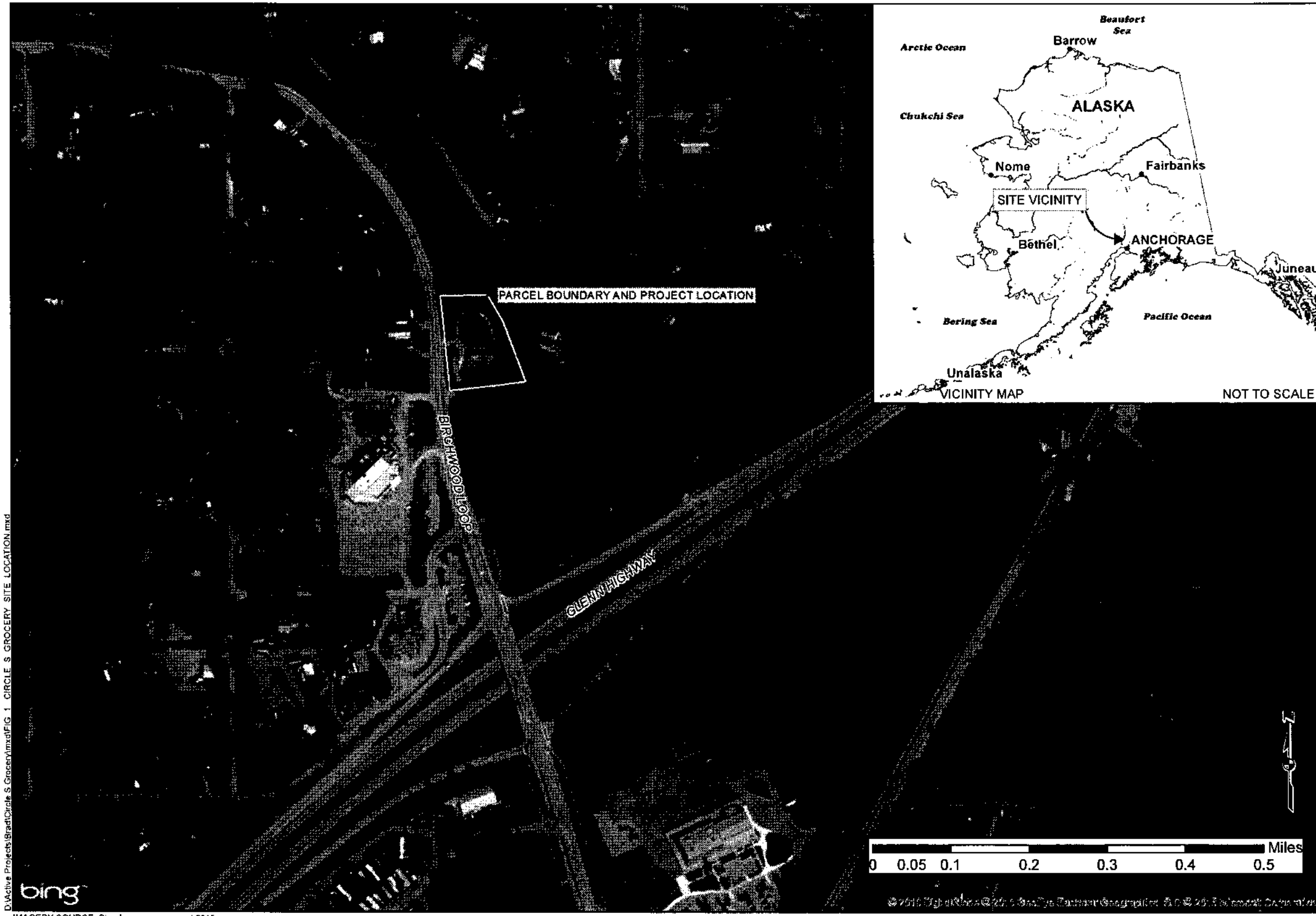

IMAGERY SOURCE: Bing Imagery, accessed 2015

D:\Active Projects\Brad\Circle S Grocery\mxd\FIG 1 CIRCLE S GROCERY SITE LOCATION.mxd

DATE: SEPT. 2015
CHKD: B.D.A.
DRWN: J.S.V.
PROJ. No.: 0313526

ERM
825 W. 8th Ave., Anchorage, AK 99501, (907) 258-4880

SITE LOCATION MAP
22189 BIRCHWOOD LOOP ROAD

CIRCLE S GROCERY SITE INVESTIGATION
BERKLEY SPECIALTY UNDERWRITING MANAGERS
Chugiak, Alaska

FIGURE
1

IMAGERY SOURCE: Bing Imagery, accessed 2015

D:\Active Projects\Brad\Circle S Grocery\mxd\FIG 2 SITE LAYOUT PROPOSED MONITORING LOCATIONS.mxd

SITE LAYOUT AND PROPOSED MONITORING WELL LOCATIONS

BERKLEY SPECIALTY UNDERWRITERS
Birchwood, Alaska

FIGURE 2

DATE: OCT. 2015
CHKD: B.D.A.
DRWN: J.E.C.
PROJ. No.: 0313526

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