2106.26.004

Environmental
Resources
Management

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10 October 2014

Mr. Daryl Gottilla
Senior Claims Examiner
Berkley Specialty Underwriting Managers
101 Hudson Street, Suite 1700
Jersey City, NJ 07302
Via e-mail: dgottilla@berkleysum.com

Subject: Drinking Water Well Sampling, Chugiak, Alaska; BSUM Claim 105081; ADEC File Number 2106.26.004, ADEC Hazard ID 24797

Dear Mr. Gottilla:

ERM Alaska, Inc. (ERM) is submitting this work plan to Berkley Specialty Underwriting Managers (BSUM) to conduct residential well sampling and a more thorough residential well research in the vicinity of the Circle S Grocery site located at 22189 Birchwood Loop Road, Chugiak, Alaska (Attachment 1; 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 is being performed in response to a request for additional site characterization, as well as drinking water sampling, sent to Ms. Porterfield by ADEC (ADEC 2014b).

BACKGROUND

In June 1995 two USTs, a 10,000-gallon gasoline UST and a 5,000-gallon diesel UST, were removed from the site. Fuel-contaminated soil was encountered during the UST removals. Laboratory analysis of soil samples collected from the bottom of the excavation indicated that remaining soil was impacted above applicable ADEC cleanup levels for petroleum hydrocarbons.

The final excavation was approximately 15 feet deep and a fuel resistant liner was placed in the excavation prior to the installation of a new UST and clean backfill. The replacement UST installed in 1995 was reported to be an 11,000-gallon dual compartment tank.

In August 1999, a limited site investigation was conducted to characterize the extent of petroleum hydrocarbon impacts to the subsurface at the site. Two soil boreholes were advanced to approximately 70 feet below ground surface (bgs). Laboratory results of soil

samples collected from the boreholes indicated that benzene and gasoline-range organics (GRO) concentrations exceeded ADEC cleanup levels. 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.

In August 2012, the dual compartment UST was removed (reported as 15,000 gallons in the UST removal report). 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 ADEC cleanup levels. 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 ADEC cleanup levels. The closure report did not state what material was used to backfill the excavation.

ADEC sent a letter to Ms. Porterfield, in June 2013 that outlined State of Alaska regulations concerning contaminated sites and responsibilities as a landowner. The letter requested that a work plan be developed to define the nature and extent of the contamination and submitted to ADEC.

ERM performed a limited site investigation in January 2014 and found petroleum hydrocarbon concentrations in excess of ADEC soil cleanup levels in samples between 14 feet bgs and 82 feet bgs within the former UST footprint (Attachment 1, Figure 2). Of particular concern is the benzene detection that exceeded the ADEC soil cleanup level in the sample collected at 82 feet bgs as this represents a potentially complete exposure pathway to current receptors via ingestion of groundwater. ERM did not encounter groundwater in any of the three boreholes installed in January 2014.

In October 2014, ADEC sent a letter to Ms. Porterfield requesting additional site characterization to delineate the vertical and horizontal extent of contamination (ADEC 2014b). ADEC also requested that the closest well to the site be sampled for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using United States Environmental Protection Agency (USEPA) Method 524.2, and that the depth to water be measured in that well. More information on the closest residential drinking water wells (e.g. location, copies of well logs, depth to water, etc.) to the site was also requested (ADEC 2014b).

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). 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 CSM conservatively assumes that these groundwater exposure pathways are complete; however, given the depth to groundwater and the observed contaminant concentrations at depth, exposure is likely to be insignificant. The CSM human health scoping form and graphical form are included in Attachment 2.

REGULATORY FRAMEWORK

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

- 18 AAC 80, *Drinking Water* (ADEC 2012);
- 18 AAC 78, *Underground Storage Tanks* (ADEC 2013b);
- 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2014a);
- Title 40 of the Code of Federal Regulations (CFR), *Protection of the Environment*, Chapter 141 (USEPA 2014);
- ADEC *Policy Guidance on Developing Conceptual Site Models* (ADEC 2010c); and
- ADEC *Draft Field Sampling Guidance* (ADEC 2010b).

Residential drinking water samples collected as part of this field effort will be submitted to the project laboratory for analysis of BTEX by USEPA Method 524.2.

FIELD ACTIVITIES

The field effort will be performed by two ERM engineers/scientists, each meeting the definition of "qualified person" as per 18 AAC 75.990(100). Field work at the former Circle S Grocery site will consist of the following work elements:

- Measuring the depth to the static water level in Ms. Pomposa Porterfield's well, located at 22179 Birchwood Loop Road;
- Collection of a drinking water sample from Ms. Pomposa Porterfield's well, located at 22179 Birchwood Loop Road, and analysis for BTEX; and
- Obtaining well information (e.g., total well depth, depth to static water level, exact location) for up to three nearby residential drinking water wells.

Pre-field Activities

Following ADEC approval of this work plan, ERM will contact the property owner of the drinking water well proposed for sampling to request permission to sample their well. ERM will attempt to contact other property owners in the vicinity of the site to obtain information about their wells and obtain permission to access their property to collect Global Positioning System (GPS) coordinates of their wells. The project laboratory (SGS North America, Inc. (SGS) of Anchorage, Alaska) will be contacted to obtain a sample kit for the field effort. 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 effort.

Private Well Data Collection

ERM will collect information on the drinking water wells at the residences and businesses in the immediate vicinity of the site. If possible ERM will obtain data regarding the depth to water and the total well depth. The coordinates of all accessible private wells in the immediate vicinity of the project site will be attained using a hand-held GPS and will be used to update Figure 2 (Attachment 1) in the report. ERM will approximate the distance between the private well and the site, as well as the well's location relative to the site (i.e. north, south, east, and west).

The closest well to the site serves both the property owner's residence (22179 Birchwood Loop Road) and the secondhand store operating at the former Circle S Grocery. The Birchwood Christian School/Crossing Church (22208 Birchwood Loop Road) and two private residences across the street from the site (22186 Birchwood Loop Road and 22111 McKinley View Avenue) also use private wells. The owner of the residence at 22111 McKinley View Avenue (Mr. Steve Northcutt) stated that his well is approximately 150 feet deep (ERM 2014). Mr. Northcutt was unable to provide the static water level for his well, or documentation of the well depth in January 2014. Nearby residences with drinking water wells are shown on Figure 2 (Attachment 1).

Well Sampling

Prior to collecting a sample from Ms. Porterfield's well (22179 Birchwood Loop Road), ERM personnel will attempt to measure the depth to static water level using an electronic calibrated tape with an accuracy of 0.01 foot without removing the pitless adapter from the well. If permission is obtained from additional private well owners and if time allows, ERM will attempt to measure the depth to static water level and total well depth without removing the pitless adapters for other wells in the immediate vicinity of the project site.

Drinking water sample collection will follow procedures outlined in ADEC's Draft Field Sampling Guidance (ADEC 2010b) and those found on the following ADEC Drinking Water Program's website:
http://dec.alaska.gov/eh/docs/dw/brochures/VOC%204.pdf. The drinking water sample will be collected from the faucet that is closest to the pressure tank. The screen, hoses, aerators, and any other devices will be removed from the faucet prior to sample collection. ERM will run the tap at one-half to three quarters flow for a sufficient amount of time to allow for water to be purged from the pressure tank. Once the water has been purged from the pressure tank, the flow will be reduced to a trickle to minimize aeration of the sample and the sample will be collected as discussed below.

1. The sample will be collected using a slow, controlled flow down the side of a tilted sample vial to minimize volatilization.

2. Fill the vial until a meniscus is visible and immediately seal the vial.
3. Once the vial is capped, invert the vial and gently tap it to ensure that no air bubbles are present. If air bubbles are present, discard the vial and repeat the process with a new vial until sample collection is complete.

One duplicate sample will be collected for quality control (QC) purposes. All samples will be placed into a chilled cooler immediately. A chain-of-custody form will be completed and will accompany the samples to the project laboratory.

QUALITY ASSURANCE/QUALITY CONTROL

The field effort will be performed in accordance with the quality assurance (QA) and QC procedures presented in this section.

Quality Assurance

Field personnel will collect samples in a manner that preserves the integrity of the sample matrix. Samplers will use certified sample media and dedicated personal protective equipment (PPE) to prevent cross-contamination between samples at each location 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.

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 field activities will be recorded in the comments section of the appropriate forms and/or in a standard field book.

Sample Identification

Samples collected for laboratory analysis will be identified with a standard sample identification number format. Sample numbers will use the following format: 14-CSG-01-WG.

In this example, "14" represents the calendar year; "CSG" represents "Circle S Grocery;"; "01" is a sequential sample number; and "WG" is the designator for sample type. Possible sample types for this project are listed below.

- WG - groundwater sample
- TB - trip blank sample

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.

Decontamination

Decontamination of re-useable sampling equipment (the water level meter) will be performed by thoroughly washing the equipment with an Alconox® solution, followed by a single rinse with potable water and then a double rinse with deionized water. Decontamination wash and rinse water will be collected in 5-gallon buckets.

Investigation Derived Waste

Investigation-derived waste anticipated to be generated is limited to PPE, paper towels used to wipe equipment dry during decontamination, and decontamination fluids. Used PPE and paper towels will be collected in a garbage bag, taped shut and disposed of as solid waste in the Anchorage Regional Landfill. Decontamination wash and rinse water will be poured onto a paved area of the site that is at a minimum of 100 feet from any drinking water wells and will be allowed to evaporate.

Quality Control

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, a field duplicate (QC) sample 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 duplicate sample will be handled, labeled and documented in the same manner as the regular field sample to prevent bias in the laboratory results. The field duplicate sample will not be identified, but will be labeled in the same manner as other field samples on the chain-of-custody form.

Data Quality Objectives

Data Quality Objectives (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 maximum contaminant levels (MCLs) set forth in 40 CFR 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; and
- Ensure that the integrity of the results is legally defensible.

The laboratory analytical DQOs for precision, accuracy, representativeness, comparability, completeness, and sensitivity for the planned drinking water sampling activities will be assessed:

- 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;
- Accuracy;
  - Surrogate percent recovery will be compared against method standards;
- Representativeness;
  - The degree to which the data adequately characterizes site conditions will be assessed;
- Completeness;
  - The completeness goal is 85% per ADEC 2009;
- Sensitivity;
  - Method detection limits will be compared to applicable MCLs and 18 AAC 75 Table C groundwater cleanup levels; and
  - Trip blank results will be compared to the limit of detection.

The project laboratory will provide summaries of the water analyses and the associated quality control samples.

Data Reduction, Validation, and Reporting

Verification 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 *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 data verification will conform to the ADEC *Environmental Laboratory Data and Quality Assurance Requirements*, Technical Memo-06-2002, dated March 2009 (ADEC 2009). 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.

SCHEDULE

Pending ADEC approval of this work plan, we anticipate conducting this field effort during October 2014. ERM will prepare a draft report detailing the work performed and the findings of this effort within three weeks of receipt of final laboratory analytical results.

Sincerely,

Caryn A. Orvis
Project Manager

Brad Authier
Partner

cc:

Ms. Pomposa Porterfield, property owner
Mr. Robert Weimer, ADEC

Attachments:

1. Figures
2. Conceptual Site Model

REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2009. Environmental Laboratory Data and Quality Assurance Requirements, Technical Memo-06-2002. March.

ADEC. 2010a. Laboratory Data Review Checklist. January.

ADEC. 2010b. Draft Field Sampling Guidance. May.

ADEC. 2010c. Policy Guidance on Developing Conceptual Site Models. October.

ADEC 2012. 18 AAC 80 Drinking Water. As amended on 20 August.

ADEC. 2013a. Letter from Mr. Robert Weimer to Ms. Pomposa Porterfield Regarding Circle S Grocery, Hazard ID No. 24797. 20 June.

ADEC. 2013b. 18 AAC 78 Underground Storage Tanks. As revised 19 July 2013.

ADEC. 2014a. 18 AAC 75 Oil and Other Hazardous Substances Pollution Control. As revised 1 October.

ADEC. 2014b. Letter from Mr. Robert Weimer to Ms. Pomposa Porterfield Regarding Circle S Grocery, Hazard ID No. 24797. 2 October.

Environmental Management Incorporated (EMI). 2012. Underground Storage Tank Removal, Site Assessment/Closure Report, ADEC Facility #1714, Circle S Grocery, 22189 Birchwood Loop Road, Chugiak, Alaska 99567. 11 October.

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TELLUS, Ltd. 1999a. Limited Phase II Release Investigation Report for Circle S Grocery, 22189 North Birchwood Loop Road, Chugiak, Alaska 99567. 27 September.

TELLUS, Ltd. 1999b. Soil Stockpile Sampling Report for Circle S Grocery, 22189 North Birchwood Loop Road, Chugiak, Alaska 99567. 4 October.

United States Environmental Protection Agency (USEPA). 2008. Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review. June. (EPA 540-R-08-01).

USEPA. 2010. Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. January. (EPA-540-R-10-011).

USEPA. 2014. Title 40 Code of Federal Regulations, Protection of Environment. As revised 1 July.

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ATTACHMENT 1

Figures

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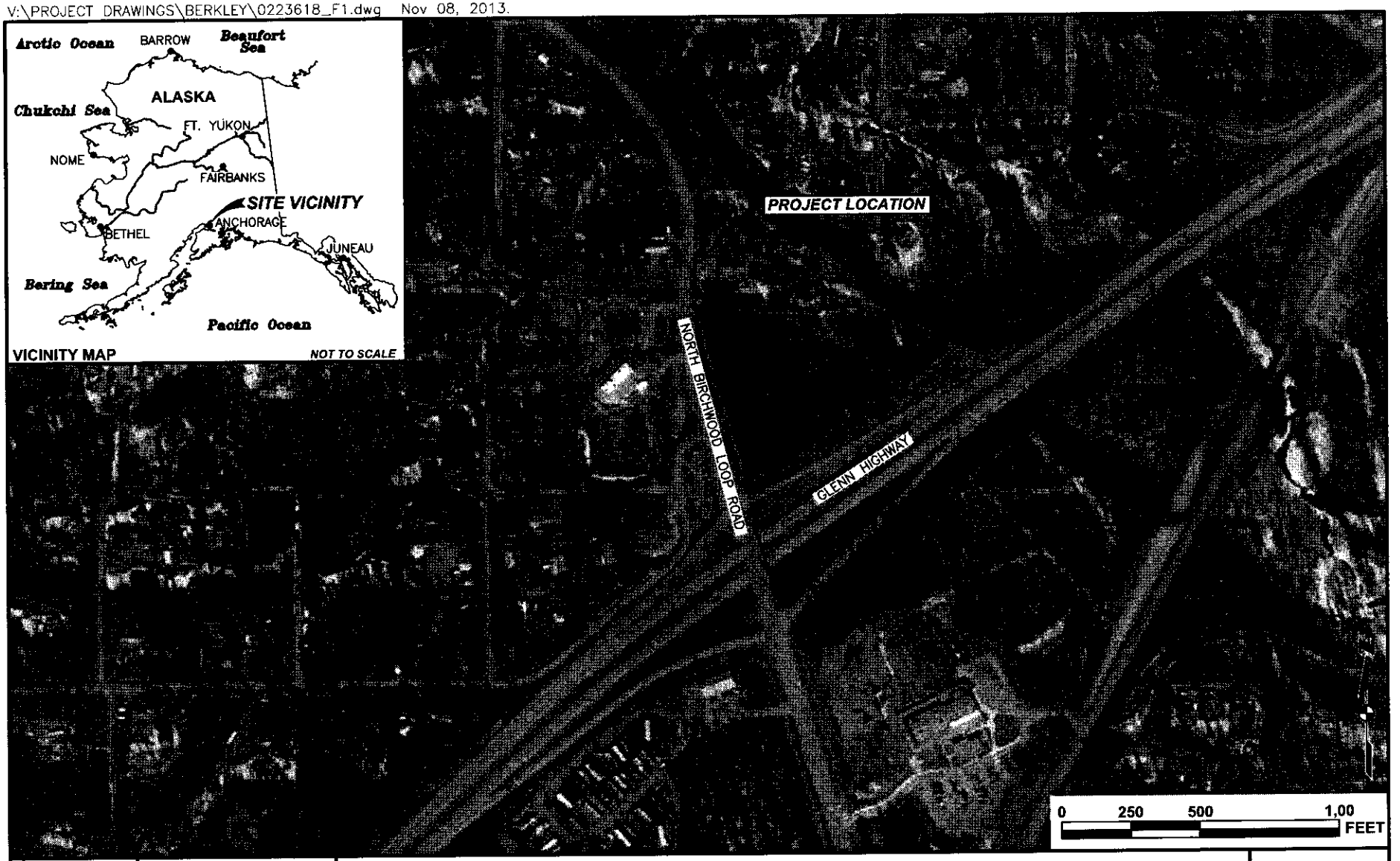
V:\PROJECT DRAWINGS\BERKLEY\0223618_F1.dwg Nov 08, 2013.



ERM

DATE: NOV. 2013
CHKD: C.O.
DRAWN: D.R.F.
PROJ. No.: 0223618

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

SOURCE: GOOGLE EARTH PRO 2010

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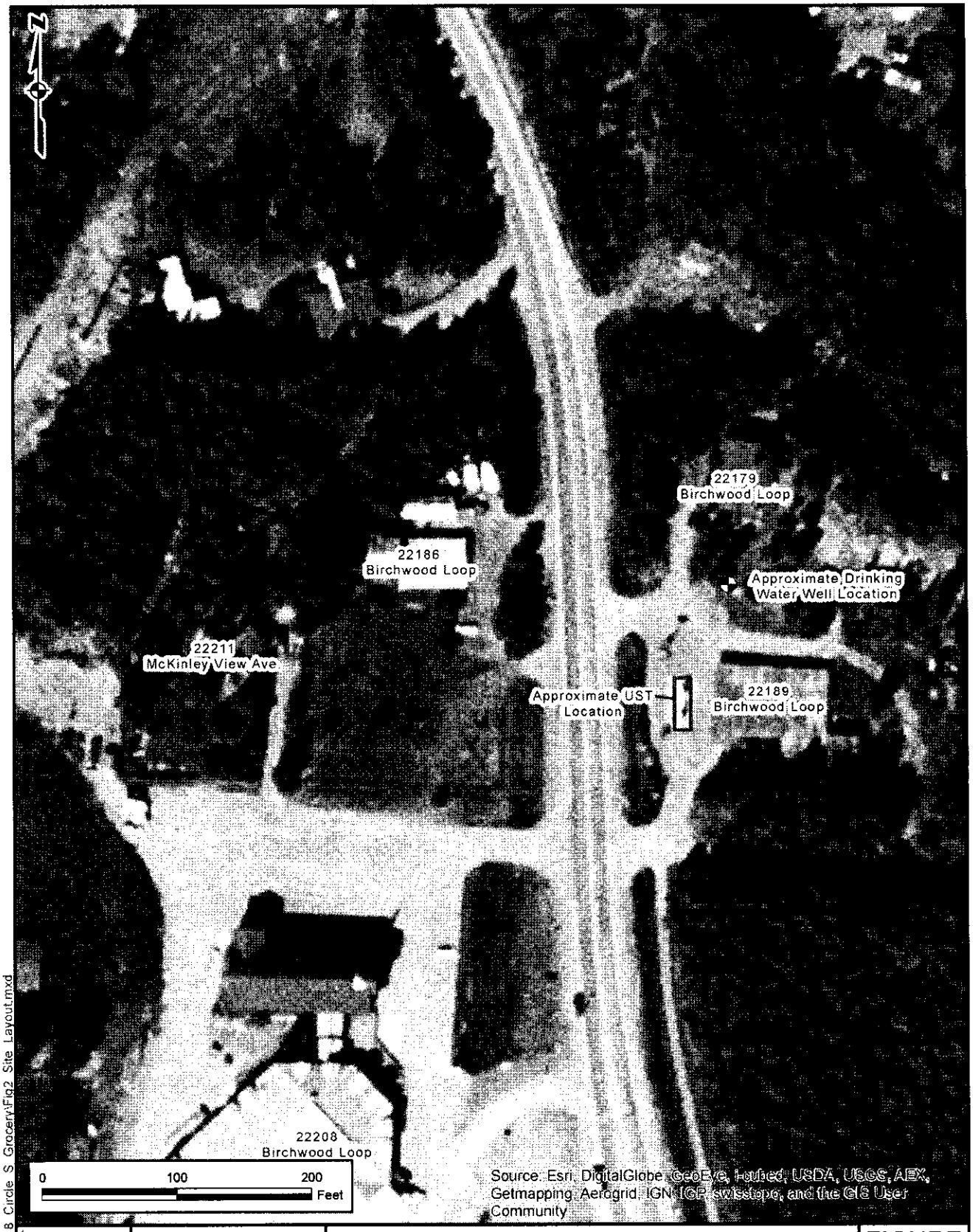

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ERM

DATE: JAN 2014
CHKD: C.O.
DRWN: S.M.C.
PROJ. No.: 0223618

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

SITE LAYOUT

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

FIGURE
2

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ATTACHMENT 2

Conceptual Site Model

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Print Form

Human Health Conceptual Site Model
Scoping Form

Site Name: Circle 5 Grocery

File Number: 2106.26.004

Completed by: Caryn A. Orvis, C.P.G.

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☒ USTs
- ☐ ASTs
- ☒ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☐ Other:

Release Mechanisms *(check potential release mechanisms at the site)*

- ☐ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☐ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☐ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

Concentrations of DRO and benzene exceeded their applicable ADEC soil cleanup levels in one sample collected at a depth interval of 14 to 16 feet below ground surface (bgs).

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

The compounds detected in the soil samples collected at depths shallower than 15 feet bgs are not listed in Appendix B of the guidance document.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the ground-water is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Groundwater was not encountered in the 2 soil borings advanced to depths of approximately 67 feet bgs at the site in 1999 or in the soil boring advanced to 82 feet bgs during the 2014 site investigation. It is assumed that given the depth to groundwater (greater than 80 feet bgs), any exposure to site contaminants is insignificant.

2. Ingestion of Surface Wate

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

Surface water bodies are not present in close proximity to the site.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☐

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☐

If all of the boxes are checked, label this pathway complete: Incomplete

Comments:

Site contaminants are not listed in Appendix C of the guidance document.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Benzene was detected at a concentration greater than the ADEC soil cleanup level in 1 sample collected at a depth interval of 14 to 16 feet bgs. Given the depth to contaminated soil and the fact that potential exposure would come from outdoor air, any exposure to site contaminants via this pathway would be insignificant.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☐

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Incomplete

Comments:

The occupied building present at the site is located greater than 30 horizontal feet from the petroleum contaminated soil remaining at the site.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Circle S Grocery
ADEC File No. 2106.26.004

Completed By: Caryn A. Orvis, C.P.G.
Date Completed: 11 February 2014

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column must agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Media	Transport Mechanisms	Exposure Media	Exposure Pathway/Route	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☐ Surface Soil (0-2 ft bgs)	☐ Direct release to surface soil — check soil									
	☐ Migration to subsurface — check soil									
	☐ Migration to groundwater — check groundwater									
	☐ Volatilization — check air									
	☐ Runoff or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☑ Subsurface Soil (2-15 ft bgs)	☐ Direct release to subsurface soil — check soil									
	✓ Migration to groundwater — check groundwater									
	✓ Volatilization — check air									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Ground-water	☐ Direct release to groundwater — check groundwater									
	☐ Volatilization — check air									
	☐ Flow to surface water body — check surface water									
	☐ Flow to sediment — check sediment									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Surface Water	☐ Direct release to surface water — check surface water									
	☐ Volatilization — check air									
	☐ Sedimentation — check sediment									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
☐ Sediment	☐ Direct release to sediment — check sediment									
	☐ Resuspension, runoff, or erosion — check surface water									
	☐ Uptake by plants or animals — check biota									
	☐ Other (list):									
		☑ soil	✓ Incidental Soil Ingestion	F	F	F	F			
			☐ Dermal Absorption of Contaminants from Soil							
			☐ Inhalation of Fugitive Dust							
		☑ groundwater	✓ Ingestion of Groundwater	I						
			✓ Dermal Absorption of Contaminants in Groundwater	I						
			✓ Inhalation of Volatile Compounds in Tap Water	I						
		☑ air	✓ Inhalation of Outdoor Air	I	I	I	I			
			☐ Inhalation of Indoor Air							
			☐ Inhalation of Fugitive Dust							
		☐ surface water	☐ Ingestion of Surface Water							
			☐ Dermal Absorption of Contaminants in Surface Water							
			☐ Inhalation of Volatile Compounds in Tap Water							
		☐ sediment	☐ Direct Contact with Sediment							
		☐ biota	☐ Ingestion of Wild or Farmed Foods							

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