ADDENDUM NO. 3

TO THE BID DOCUMENTS

Raw Water Transmission Line Replacement Project

CITY OF HOMER, ALASKA

Addendum Issue Date: September 12, 2025

Bid Submittal Date: September 19, 2025

Previous Addenda Issued: 2

Issued By: Leon Galbraith, P.E.
City Engineer
City of Homer

Notice to Bidders:

Bidders must **acknowledge receipt of this addendum** by including the Addenda Acknowledgement Form with the bid.

Bidders are required to acknowledge each addendum separately on the Addenda Acknowledgement Form. Any bids received without acknowledgment of addenda may be rejected prior to evaluation.

The Bid Documents for the above project are amended as follows (all other terms and conditions remain unchanged):

The following bidder questions have been received by the City of Homer and are answered as follows:

1. Q. Could you provide the geotechnical study performed by DOWL in March of 2021 which is mentioned in the Erosion and Sediment Control Plan?
   A. Geotechnical study is attached.

2. Q. Section 611 talks about 'modification' to both existing VFD & SCADA system. What are the existing VFDs? Can you provide information regarding the existing SCADA system?
   A. The VFDs are Siemens MicroMaster 430

3. Q. Is the 12-strand, single mode fiber optic cable required to be OS1 or OS2?
   A. Type shall be OS2

4. Q. For the 12-strand, single mode fiber optic cable, is there any specific connector type needed for terminations?

A. *Termination shall be type LC*

5. Q. For fiber optic termination at both ends, is the termination location a rack-mounted location? If so, how many rack units are available at this unit or will a wall mounted cabinet be required?
   A. *At the water treatment plant the termination shall be at the rack under the stairs with 4 units of space. At Pump Station Building assume a new wall-mounted cabinet will be required for fiber optic termination.*

6. Q. The plans say that pipe bedding will be either class B or C. Which class will be specified?
   A. *If native backfill is found to be unsuitable for pipe bedding, then Class B is preferred.*

7. Q. Could you provide the Bridge Creek Pump Station Test Pit Work Plan from February 2024, prepared by Antheia Environmental?
   A. *The test pit plan is attached.*

TECHNICAL MEMORANDUM

TO:	Jan Keiser, City of Homer
FROM:	Paul Pribyl and Anna Ferntheil, P.E.
THROUGH:	Neil McMahon
DATE:	March 1, 2021
PROJECT:	Raw Water Transmission Line Replacement Geotechnical Conditions Desktop Study

INTRODUCTION

The City of Homer (City) plans the replacement of the existing cast iron raw water transmission lines from the Bridge Creek Reservoir intake pump station (Pump Station) to the Water Treatment Plant (WTP). The existing 8-inch and 10-inch cast iron mains will be replaced with parallel 12-inch high-density polyethylene (HDPE) pipelines (mains) or a single larger diameter main yet to be determined.

The purpose of this report is to support the design and construction of the proposed Raw Water Transmission Line Replacement project. This report presents the results of our desktop study, considerations for additional geotechnical investigations, and preliminary geotechnical engineering recommendations and construction considerations. This work was completed for the City of Homer.

Planned Development

The proposed project includes the installation of parallel 12-inch HDPE mains along approximately 3,800 linear feet of alignment using open-cut trench methods. The new mains will be installed within the Carter Road right-of-way (ROW) and section line easement as shown in the City Concept Design Typical Trench Section included as Attachment A. The new transmission mains will be installed at the approximate same depth of burial as the existing 8-inch cast iron main.

This report is valid only for the planned development as it is currently understood. Changes to the current development plans may impact the preliminary recommendations contained herein and should be evaluated by the project geotechnical engineer.

Scope of Work

DOWL submitted a proposal under DOWL's existing term contract with the City dated January 11, 2021, which included geotechnical services consisting of performing a desktop study of existing geological and geotechnical information in the vicinity of the project and issuing a memorandum of the findings from the desktop study, recommendations for future geotechnical explorations (if any), and preliminary design and construction considerations. The task order for this work was executed on January 14, 2021.

Background Review

DOWL completed a review of the available information in the vicinity of the project from the following sources:

- DOWL's in-house soils library.
- United States Geological Survey (USGS).
- United States Department of Agriculture (USDA).
- Alaska Department of Natural Resources (DNR) Well Log Tracking System (WELTS).
- Public libraries including the Alaska Public Interlibrary Loan Catalog, Anchorage Public Library Catalog, Alaska Resources Library and Information Services (ARLIS), and Homer Public Library Catalog.
- Record drawings and reports provided by the City of Homer.

In general, there is site-specific subsurface information available for the WTP and Pump Station, but no site-specific information for the majority of the water transmission main alignment. However, enough information is available to draw general conclusions about anticipated conditions. A summary of available subsurface information follows:

- The record drawing from the 1979 City of Homer Water Supply Improvements, Raw Water Pump Station Expansion and Treatment Plant Expansion contains four soil profiles at the WTP.
- A geotechnical report for the 1.0 Million Gallon Water Storage Project (CH2M Hill 2002), includes two test pit logs conducted in 2002 and one test pit log from 1995 at the WTP.
- Thirteen test boring logs to a depth of 10 feet and three test pits to depths of about 4 to 6 feet near the Pump Station from a spill contamination assessment report (Lambe Engineers 1994).
- Five test pits excavated to depths of 7 to 11 feet within the new building and septic leach field area of the new water treatment plant in 2007 (Duane Miller and Associates 2007).
- Two groundwater wells logs near the project area were obtained from DNR's WELTS system.
- A water improvement study containing summaries of subsurface materials encountered at the Bridge Creek Dam location and adjacent area (Olympic Associates 1983).
- Several USGS reports with descriptions of soils and bedrock in the general area including Diamond Ridge.
- USDA National Cooperative Soil Survey data providing very generalized descriptions of the near-surface soils in the area.

A list of the relevant resources found in our background review is presented in the References section and a map showing the location of data sources is included as Attachment B. The subsurface logs from applicable references are included in Attachment C.

PHYSICAL SETTING

Area Topography and Development

The city of Homer WTP plant is located on Diamond Ridge on the northern edge of the City of Homer. The Pump Station is located adjacent to the Bridge Creek Reservoir approximately 3,200 feet to the north of the WTP. The topography slopes downward to the north from the WTP to the Pump Station. The WTP is at an elevation of about 1090 feet MSL and the Pump Station at an elevation of approximately 935 feet MSL. The steepest portion of the slope is estimated to be between 5 to 10 degrees within roughly 1000 feet north of the WTP. The remainder of the slope north to the Pump Station is relatively gentle. The flatter area is classified as a wetland within the Kenai Peninsula Borough (KPB) downloadable GIS wetland data.

Most of the section line easement has been cleared of trees and vegetation consists of shrubs and grasses, but smaller spruce trees may be encroaching on the edges of the easement. There is a line of power poles connecting the Pump Station to the WTP located one foot west of the easement centerline. The existing 8-inch water main is located 15 feet west of the easement centerline and is assumed to have a minimum cover depth of 7 feet. The existing 10-inch water main is located 10 feet east of the easement centerline with a minimum cover depth of 7 feet. The Carter Road ROW consists of the 30 feet west of the section line easement. The general arrangement of existing utilities is shown in the City Concept Design Typical Trench Section included as Attachment A.

Regional Geology

The city of Homer and surrounding area are located on a broad low shelf of undulating hills known as the Kenai Lowland (Karlstrom 1964). The Homer area topography is largely the result of Pleistocene glaciation. Along the northern edge of the city a bluff rises more than 800 feet above sea level including Diamond Ridge where the project is located.

The terrain north of the crest of the bluff was last glaciated during the Knik Glaciation which left a mantle of glacial till over the bedrock. During the Moosehorn stade of the Naptown Glaciation (glacial maximum ~23,000 years ago), the Kachemak Bay glacial ice margin limit was near the upper edge of the bluff. Glacial meltwater drained to the north from the edge of the ice margin and formed channels which down cut through the Knik Glaciation till and underlying bedrock (Reger 2007). Bridge Creek and Bridge Creek Reservoir occupy one of these meltwater channels.

The surficial deposits on Diamond Ridge generally consist of Knik age glacial till overlain by layers of silt loess and loam and interbedded ash, peat, and organic silt (Hall 1995). The silt loam is the product of ash influenced windblown glacial silt (USDA 2021). The bedrock is part of the Kenai Formation. This formation is of Tertiary age and is composed of moderately indurated sandstone, siltstone, mudstone, and claystone. Localized interbedded lenses of fine conglomerate and coal occur in some locations (Hall 1995). Near the project area the formation beds dip to the north at about 4 degrees below horizontal (Olympic Associates 1983).

SITE CONDITIONS

This section reports interpretations and opinions concerning the surface and subsurface soil and groundwater conditions at the site based on the available background research information. If additional data becomes available, some or all of the interpretations and opinions expressed herein could change.

Subsurface

The subsurface information presented here is a summary of the available data and interpretation of likely characteristics. The likely subsurface materials presented are based on the regional geology and limited amount of site-specific information. In general, we anticipate the primary subsurface materials encountered will consist of peat, loess, glacial till, and bedrock. It is possible backfill from the installation of the existing 8-inch water main will be encountered.

Peat. Peat is anticipated to be present across the site. The surficial layer of peat deposits is typically fibrous where active vegetative growth is occurring. Increasing decomposition at deeper depth generates an amorphous texture. Further decomposition can lead to formation of organic silt. The peat may also be interbedded with layers of ash. The area from 1000 feet north of the WTP to the Pump Station is mapped as wetland by the KPB and peat ranging from 1 to 5 feet thick is common in wetlands in the region; however, isolated areas may be many feet thicker.

Loess. The surficial organics and peat are expected to be underlain by a layer of windblown sediments (loess). The windblown sediments are likely to be composed of silt and fine sand with Unified Soil Classification System classifications of silt, sandy silt, silty sand, and silty clay. At other locations on Diamond Ridge interbedded layers have ash have been observed within the loess (Hill 1995).

The loess at the WTP is described as gray to gray-brown, very loose, and classified as silt and silty sand (CH2M Hill 1979) but it may be brown at other locations (USDA 2021). The loess encountered during exploratory drilling at the Bridge Creek Dam location consisted of 4 feet of silty clay (Olympic Associates 1979). The loess exposed by the 2002 test pits at the WTP ranged in color from mottled brown and gray to light brown, firm, and ranged in classification from sandy silt to silty sand (CH2M Hill 2002). Similar characteristics were described for the loess exposed for the new WTP (Duane Miller and Associates 2007).

This material may overlie glacial till or be directly on bedrock such as at the WTP (CH2M Hill 1979; CH2M Hill 2002) and the Pump Station (Lambe Engineers 1994).

Glacial Till. Glacial till deposits are typically unsorted mixtures of silt, sand, gravel, and boulders. These deposits generally range from silty sand with gravel to silty gravel with sand. At the Bridge Creek Dam location, the largest boulder observed was on the order of 2-foot diameter (Olympic Associates 1979). Glacial till is often dense to very dense. The till observed during exploratory drilling at the Bridge Creek Dam location had a maximum thickness of 30 feet overlying bedrock (Olympic Associates 1979).

Bedrock. The bedrock at the site is anticipated to be composed of alternating layers siltstone, sandstone, mudstone, and claystone with layers of coal. Test borings at the Bridge Creek Dam

encountered about 60 percent siltstone, 30 percent sandstone, and 10 percent coal (Olympic Associates 1979). This is consistent with near-by water well logs which show alternating layers ranging from a few feet to about 20 feet thick (DNR WELTS 2021).

At the Bridge Creek Dam location, the bedrock is described as weathered and decomposed in the upper two feet with relatively fresh rock occurring below. However, the bedrock appeared to be fractured throughout (Olympic Associates 1979). Excavated rock from the Kenai Formation observed in quarries in the area shows that the bedrock breaks down to sand and gravel sizes but is generally too soft to serve as rock fill but could serve as sand fill (Olympic Associates 1979).

At the WTP, bedrock has been encountered at depths of about 5 to 10.5 feet below the original ground surface. Bedrock is composed of mudstone and siltstone. It is noted that a test pit was extended to a depth of 8 feet below the top of rock with a Case 580 B backhoe with a 24-inch bucket and that “all material can be ripped and excavated to the depth tested by conventional construction equipment such as a D-8 ripper Caterpiller” (CH2M Hill 1979). The two test pits conducted in 2002 for the million-gallon water tank described excavation into the bedrock as difficult to achievable with some difficulty (CH2M Hill 2002). This is confirmed by the test pits conducted in 2007 where it is reported that the bedrock is weak, laminated, and easily fractured into 1 to 2-inch thick pieces with conventional excavating equipment; with the addition of water and mechanical action, it rapidly breaks down into silt and/or sand (Duane Miller and Associates 2007).

The test boring logs from the area around the Pump Station describe material below the loess as clay, sandy clay, and silty clay (Lambe Engineers 1994). The material was hard to very hard and contained trace coal in two of the borings. Our interpretation is that this material is bedrock or weathered bedrock of the Kenai Formation. The bedrock was encountered at depths ranging from 3.5 to 10 feet below the ground surface.

Fill. The planned location for the new 12-inch transmission mains is adjacent to the existing 8-inch main. It is possible that the new trench will expose backfill from the original 8-inch main installation. The quality and quantity of the trench backfill is unknown. Fill exists at the surface forming gravel pads and roads adjacent to both the WTP and Pump Station.

Groundwater

The northern approximate 2,600 linear feet of the alignment is within an area mapped as a wetland. Photographs of this area show ponded water at the ground surface. Groundwater should be expected to be encountered during excavation in this area and may be present throughout the project. Groundwater was noted as seepage at the top of the bedrock within the test pit logs at depths between 5.5 to 11.5 feet below the ground surface at the WTP. Groundwater was noted as high as 1.5 feet below the ground surface on the test boring logs from adjacent to the Pump Station.

Seismicity and Faulting

The geotechnical report for the WTP classified the site soils as Site Class C, Very Dense Soil and Soft Rock (Duane Miller and Associates 2007). Updated mapped acceleration parameters, site coefficients, and adjusted maximum considered earthquake spectral response acceleration

parameters determined using the USGS Design Maps application based on the IBC 2015, Seismic Site Class C, are provided as Appendix D.

Liquefaction. Liquefaction is the partial or total loss of strength of soils that can occur during strong earthquake shaking of significant duration which can lead to settlement. Earthquake-induced liquefaction generally occurs only under particular conditions, including high groundwater table, strong earthquake ground shaking of long duration, and loose uniform sands. The loess material may contain zones of material which are liquefiable. Although more site-specific information, such as in-place density and gradation, is necessary to perform a liquefaction analysis, we believe the risk of liquefication-induced settlement beneath the pipe is low assuming all soft and loose material is removed from beneath the new mains during construction.

Land Spreading. There are no known active (Quaternary age) faults mapped across the water main alignment (USGS and DNR 2021). As there are no known active faults, we believe the risk of seismically induced permanent ground displacement is low.

Slope Instability. This water main alignment is in a generally topographically flat area with gentle slopes where they do occur. The risk of seismically induced slope instability is low.

GEOTECHNICAL CONSIDERATIONS AND PRELIMINARY RECOMMENDATIONS

These considerations and preliminary recommendations are based on professional judgment and experience and the available data. These recommendations generally are not the only design options available; there may be several acceptable alternatives. These recommendations are not intended to represent the only way, but rather to indicate one appropriate option based on the information available.

Considerations for Additional Investigation

In general, it is feasible to construct the transmission main replacement without any additional geotechnical investigation. Placing the new mains adjacent to the existing mains improves the likelihood that the soils at the burial depth are generally suitable to support the mains.

One limitation of the desktop study is that it will be difficult to determine accurate contract quantities of trench backfill and unsuitable material disposal without current and targeted geotechnical data along the main alignment. This creates a risk for a changed quantities dispute during construction. Much of the anticipated native material may not be compactable and thus unsuitable for backfill over the new utility. Excavated bedrock may be suitable for backfill above the utility bedding but the quantity and quality of excavated rock is unknown due to lack of information on depth to bedrock and site-specific lithology. Depending on how close the new mains are installed to the existing 8-inch main, some of the trench excavation may be within the backfill of the existing main. The quality and extents of the existing backfill are unknown but may be suitable for reuse.

Without additional information on the potential to reuse the existing fill around the 8-inch main, depth to bedrock, and feasibility of compaction of excavated spoils, the City should plan for the potential need to remove and replace all trench excavation with imported granular backfill meeting the requirements for bedding and trench backfill as described in the following sections.

There may be potential cost savings and risk reduction for changed quantities during construction by conducting a limited test pit exploration to determine the potential reusability of excavated material as backfill. The depth to bedrock, difficulty of excavation, and suitability of excavated rock for backfill could also be explored. Test pits conducted at approximately 500-foot intervals and laboratory testing consisting of moisture content determination, sieves, and proctors should be sufficient to establish a more accurate estimate of the quantity of excavated material suitable for reuse as backfill. We recommend that the test pits are observed and sampled by an engineering geologist or geotechnical engineer to ensure the soils are appropriately classified and that representative soil samples are collected.

Earthwork

All earthwork shall be conducted in accordance with the Homer Standard Construction Specifications for Earthwork, Division 200.

Excavation

All peat, silt, frozen, or otherwise unsuitable soil that does not meet the requirements for bedding or backfill must be removed and replaced with bedding and backfill. Any peat, very soft

silt, or other material deemed unsuitable by the engineer or inspector to support the water mains, present at the bottom of excavation should be over-excavated and replaced with backfill to the bottom of bedding depth shown on the plans.

The bottom of excavation should be scarified and recompacted prior to placement of bedding and backfill material.

Surface organics should be separated from the excavated material and replaced over the trench after backfilling is complete. In wetland areas, excavated material should be stockpiled on a geotextile to protect the underlying vegetation and prevent fill of the wetlands.

Cut Slopes

Temporary cut slopes for utility trenches and for foundation excavations in both granular and fine-grained soils have been known to stand temporarily at very steep angles; however, they also have been known to fail suddenly, without warning, claiming lives. It is the responsibility of the Contractor to determine appropriate temporary cut slopes or shoring for excavations and trenches for the site soils, and surface loading conditions. As a minimum, the contractor should be in full compliance with federal, state, and local safety requirements for trenching and shoring.

Geotextile

A separation geotextile is used to permanently separate two distinct layers of soil in an excavation. If silty material is encountered at the bottom of the excavation, a geotextile should be used to separate the utility bedding from the subgrade. If silty excavated material is approved for reuse by the inspector as backfill above the bedding, a geotextile should be used to separate the bedding from the backfill.

Utility Bedding and Trench Backfill

A suitable granular bedding material meeting the gradation requirements of Class “B” Bedding, as described in Section 211.2, Homer Standard Specifications, or the manufacturer’s recommended gradation should be placed and compacted to a depth of at least six inches below utility lines. This bedding material should extend six inches above the top of pipe and should be compacted to 95 percent of the maximum dry density as determined by modified Proctor, ASTM D1557.

The remainder of the trench can be backfilled with excavated material shown to be compactable and approved for reuse by the engineer or engineer’s representative. Imported backfill should at a minimum meet the requirements for classified material Type IV as described in Section 205.2, Homer Standard Specifications. Trench backfill should be compacted in lifts not exceeding one foot in thickness to 90 percent of the maximum dry density as determined by modified Proctor, ASTM D1557.

Fill Testing

Frequent, in-place density tests should be performed in each lift of fill to verify that the fill has been properly compacted prior to placing subsequent lifts. The number of tests performed in each lift should be commensurate with the size of the area worked by the contractor, the

variability of the soil types used as fill, and the amount of time an inspector spends on site observing the work.

At a minimum, we recommend one in-place density test per 400 lineal feet of utility trench bedding and backfill, every lift. The frequency of in-place density testing can be reduced at the inspector's discretion once the Contractor has demonstrated adequate and consistent means and methods to meet the minimum density requirements. The frequency of in-place density testing can be increased at the inspector's discretion due to changes in compaction means and methods or variability among the material used as bedding or backfill.

Dewatering

High groundwater was noted on the test boring logs adjacent to the Pump Station. Based on the wetland classification and site photographs, it is anticipated that trench dewatering will be required in the northern 2,600 linear feet of the alignment and possibly throughout the alignment. It is the Contractor's responsibility to determine the appropriate dewatering techniques for the construction methods chosen and for the soil and water conditions encountered.

Construction Observation

We recommended that excavation and backfill operations be observed by a qualified inspector under the supervision of a geotechnical engineer. The bottom of the trench should be inspected prior to backfilling to ensure a suitable subgrade is present. Excavated spoils should be approved for backfill above the bedding before being placed in the trench. Unsuitable material should be removed and replaced with Contractor-furnished trench backfill when directed by the inspector. Frequent in-place density tests should be performed in each lift of the bedding and backfill to verify that minimum fill densities are being attained.

The inspection/testing personnel should be employed by the Owner or Owner's representative, not by the contractor, to avoid an inherent conflict of interest and to better ensure that the required level of quality assurance is achieved.

LIMITATIONS

DOWL based the conclusions and recommendations presented in this report, based on the limited subsurface information available during the desktop study. If during construction, subsurface conditions are different from those encountered in the explorations, advise DOWL at once to review those conditions and reconsider recommendations if necessary. The geotechnical recommendations provided herein are based on the premise that an adequate program of tests and observations will be conducted during construction in order to document compliance with DOWL's recommendations and to confirm conditions exposed during subgrade preparations. DOWL geotechnical personnel must review final designs to verify that recommendations provided herein have been properly implemented.

If there is a substantial lapse of time between submission of this report and the start of work at the site, and especially if conditions have changed due to natural causes or construction operations at or near the site, contact DOWL to review this report and to evaluate the applicability of the conclusions and recommendations presented herein.

DOWL prepared this report for the City of Homer and their Consultants use on this project. DOWL recommends you make this report available to prospective contractors for information and factual data only, but not as a warranty of subsurface conditions. DOWL prepared this report, including engineering analyses, recommendations, figures, and design details specifically for the above referenced site. These recommendations are not applicable to other construction sites. Do not separate the figures from the text for independent use.

DOWL performed these services consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar time and budgetary constraints. No warranty is made or implied.

Any conclusions made by a construction contractor or bidder relating to construction means, methods, techniques, sequences, or costs based upon the information provided in this report are not the responsibility of DOWL.

If you have any questions regarding this report or its use, or if we may provide additional services, please call.

Attachments:

Attachment A: City Concept Design Typical Trench Section

Attachment B: Available Subsurface Information Map

Attachment C: Available Subsurface Logs

Attachment D: USGS Seismic Design Map

REFERENCES

Alaska Department of Natural Resource Well Log Tracking System (DNR WELTS). 2021. *Well Log IDs 33084 and 32640*. https://dnr.alaska.gov/welts/#show-welts-intro-template. Accessed January 27, 2021.

CH2M Hill. 1979. *City of Homer Water Supply Improvements, Homer, Alaska. Raw Water Pump Station Expansion and Water Treatment Plant Expansion.*

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Karlstrom, T.N.V.1964. *Quaternary geology of the Kenai Lowland and glacial history of the Cook Inlet region, Alaska*: U.S. Geological Survey Professional Paper 443, 69 p., 7 sheets.

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Reger, R.D. 1977. *Photointerpretive map of the surficial geology of the southern Kenai lowlands*: Alaska Division of Geological & Geophysical Surveys Alaska Open-File Report 111A, 1 sheet, scale 1:63,360.

Reger, R.D., Sturmann, A.G., Berg, E.E., and Burns, P.A.C. 2007. *A guide to the late Quaternary history of northern and western Kenai Peninsula, Alaska*: Alaska Division of Geological & Geophysical Surveys Guidebook 8, 112 p., 6 sheets, scale 1:63,360

Waller, R.M., Feulner, A.J., and Morris, D.A. 1968. *Water resources and surficial geology of the Homer area, south-central Alaska*: U.S. Geological Survey Hydrologic Investigations Atlas 187, 1 sheet, scale 1:63,360.

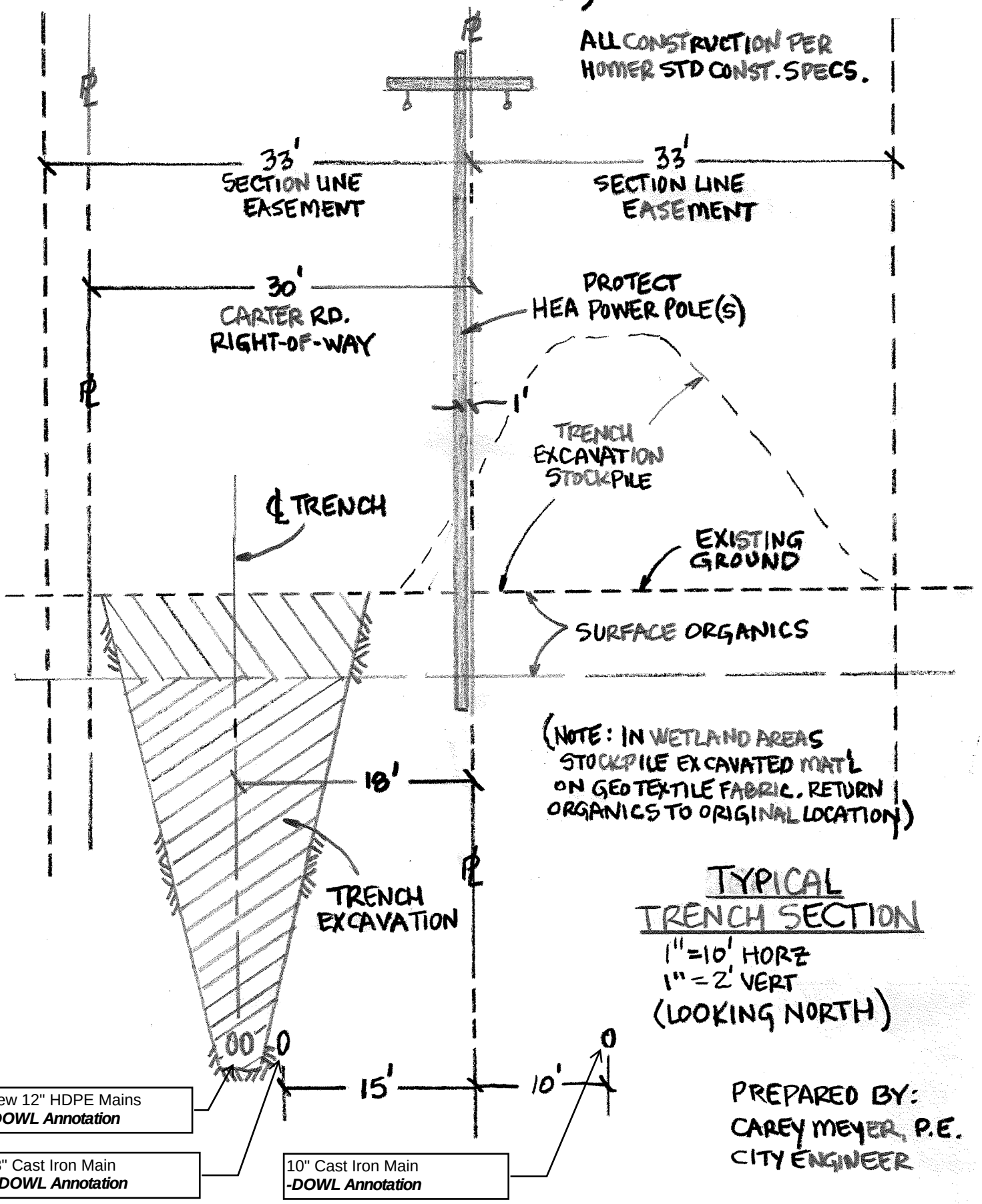
United States Department of Agriculture (USDA). 2021. Natural Resources Conservation Service, National Cooperative Soil Survey. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed January 26, 2021.

U.S. Geological Survey and Alaska Department of Natural Resources. 2021. Quaternary fault and fold database for the United States, accessed February 22, 2021, at: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults.

ATTACHMENT A

City Concept Design Typical Trench Section

ENGINEERED PLAN
(CONCEPT DESIGN)



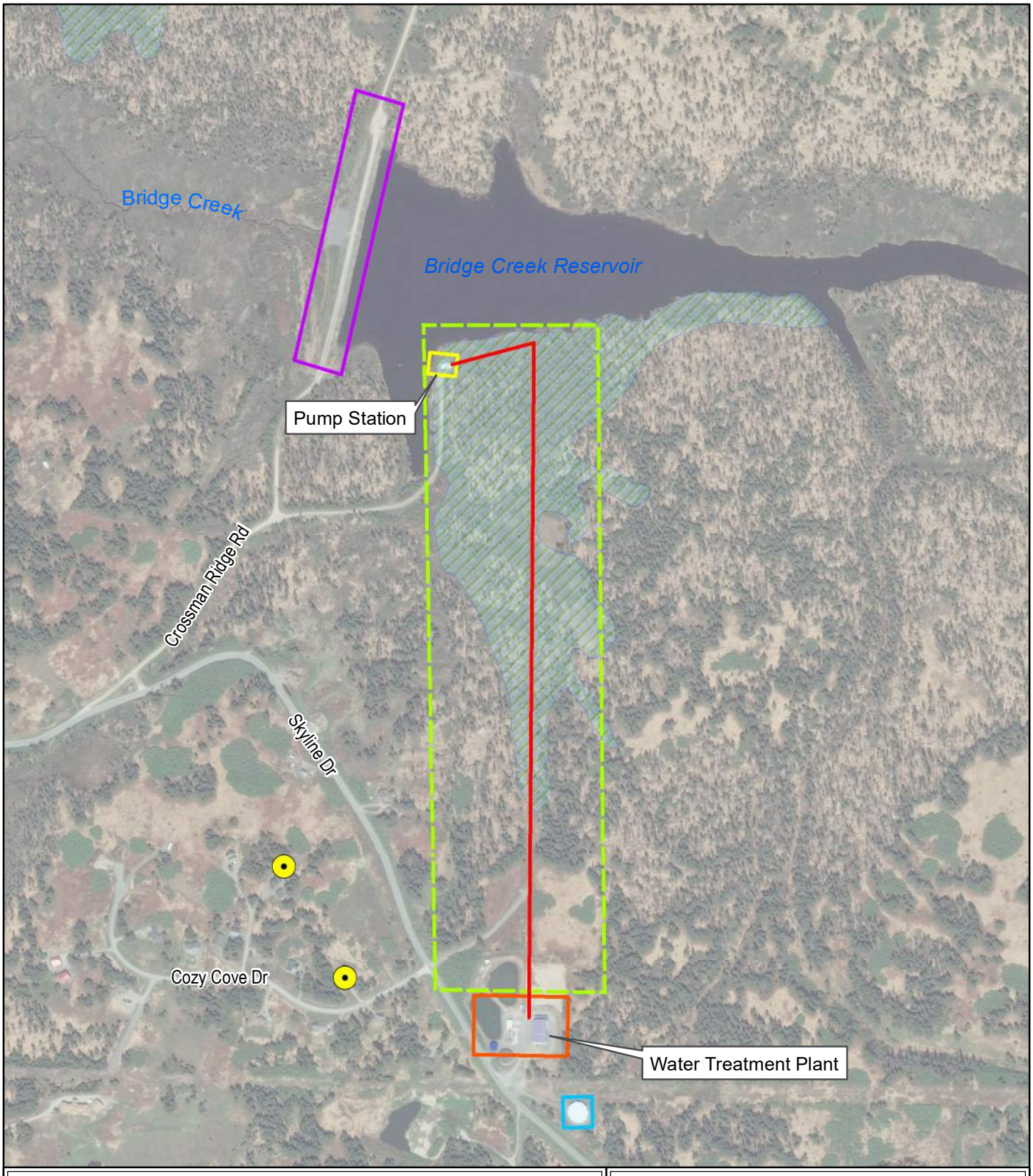
TYPICAL TRENCH SECTION

1" = 10' HORZ
1" = 2' VERT
(LOOKING NORTH)

PREPARED BY:
CAREY MEYER, P.E.
CITY ENGINEER

ATTACHMENT B

Available Subsurface Information Map



Transmission Main Alignment
Water Tank Test Pits 2002
Spill Assessment Exploration 1994
WTP Explorations 1979, 1995, 2007
Olympic Associates 1983
DNR WELTS Well Log
USDA National Cooperative Soil Survey
KPB Lowlands Mapped Wetlands

N

Feet
0 250 500

Available Subsurface Information Map

Raw Water Transmission Main Replacement

DOWL

Date: February 11, 2021

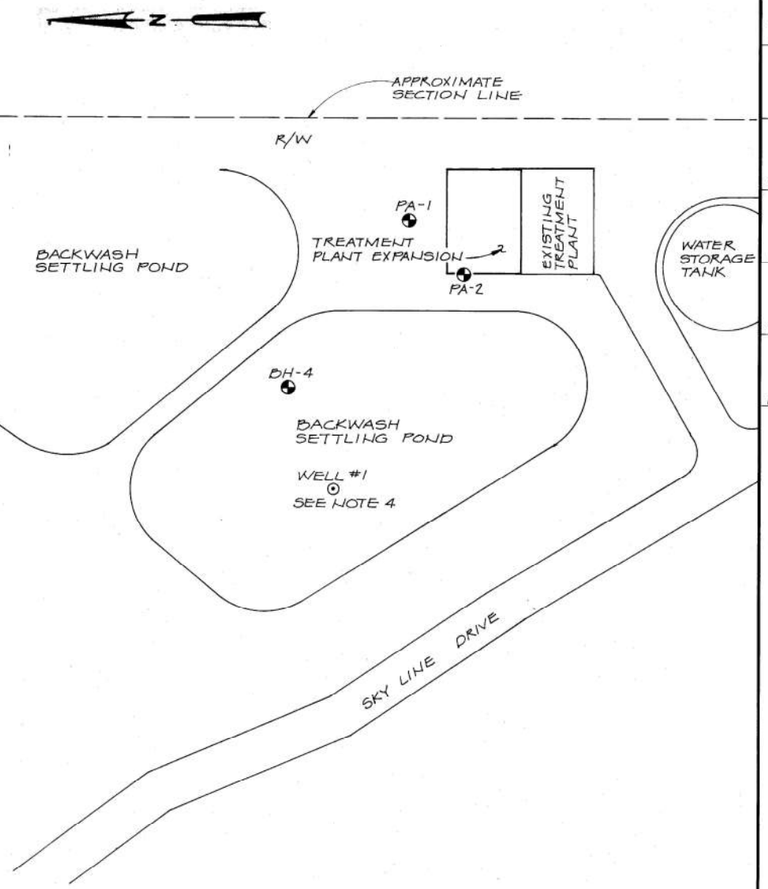
Figure B-1

\\dowl.com\j\Projects\28\62417-03\60GIS\GEO\Available Information Map.mxd Feb 11, 2021 10:30:44 AM User: ppribyl

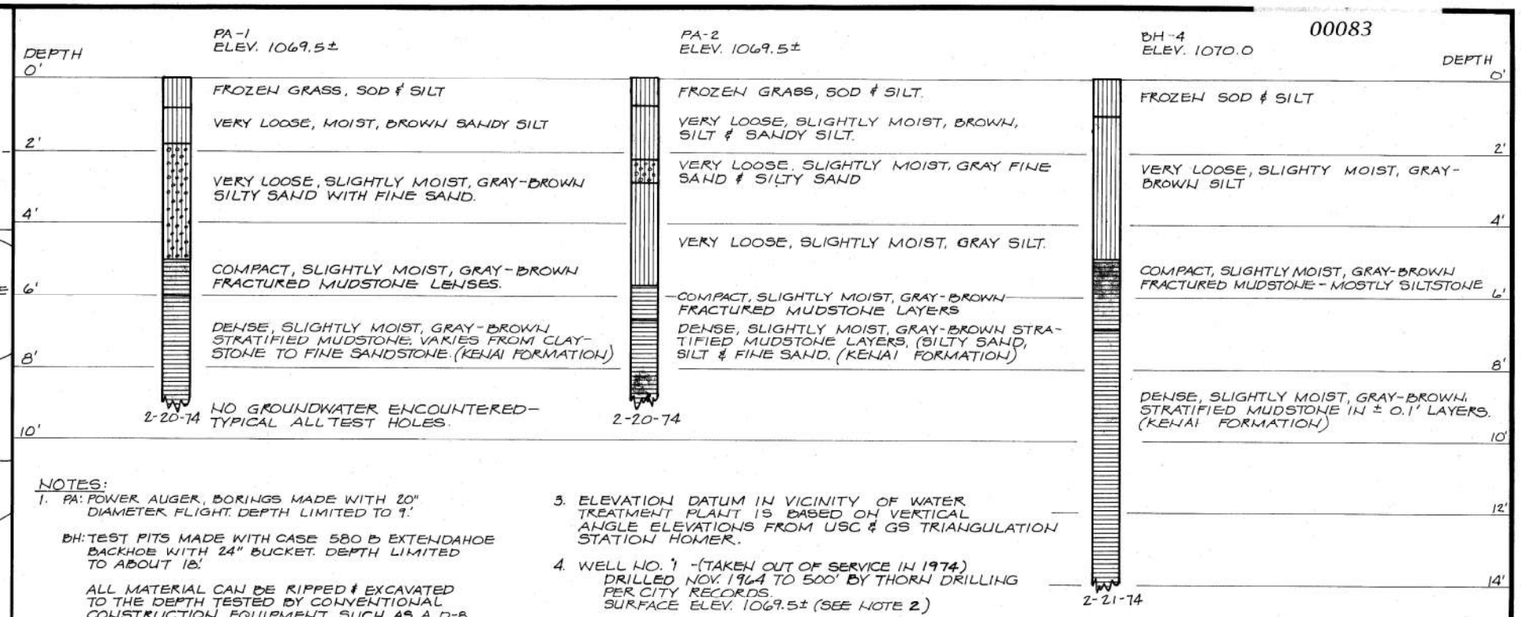
ATTACHMENT C

Available Subsurface Logs

CH2M Hill. 1979. ***City of Homer Water Supply Improvements, Homer, Alaska. Raw Water Pump Station Expansion and Water Treatment Plant Expansion.***



TEST HOLE PLAN
1"=40'



NOTES:

1. PA: POWER AUGER, BORINGS MADE WITH 20" DIAMETER FLIGHT. DEPTH LIMITED TO 9.'

   BH: TEST PITS MADE WITH CASE 580 B EXTENDAHOE BACKHOE WITH 24" BUCKET. DEPTH LIMITED TO ABOUT 18.'

   ALL MATERIAL CAN BE RIPPED & EXCAVATED TO THE DEPTH TESTED BY CONVENTIONAL CONSTRUCTION EQUIPMENT SUCH AS A D-8 RIPPER CATERPILLAR. NO REFUSAL TO EXCAVATING EQUIPMENT BY SOIL CONDITIONS.

2. SURFACE ELEVATIONS SHOWN HAVE BEEN PICKED OFF CONTOUR MAP OF ORIGINAL GROUND BEFORE TREATMENT PLANT OR BACKWASH PONDS WERE CONSTRUCTED. THEY ARE THEREFORE ONLY APPROXIMATE.

3. ELEVATION DATUM IN VICINITY OF WATER TREATMENT PLANT IS BASED ON VERTICAL ANGLE ELEVATIONS FROM USC & GS TRIANGULATION STATION HOMER.

4. WELL NO. 1 -(TAKEN OUT OF SERVICE IN 1974) DRILLED NOV. 1964 TO 500' BY THORN DRILLING PER CITY RECORDS. SURFACE ELEV. 1069.5± (SEE NOTE 2.)

   DRILLER'S LOG INDICATED THE FOLLOWING:

0-5	MUSKEG & TOPSOIL	AS IDENTIFIED BY DRILLER
5-6	SANDSTONE	
6-18	YELLOW CLAY	
18-37	CLAY SAND (HARD)	

   REMAINDER OF LOG TO 500' AND WELL TEST REPORT FILED IN CITY PUBLIC WORKS RECORDS. CH2M HILL HAD NO INVOLVEMENT IN THIS WORK. WELL INFORMATION ADDED ONLY FOR CONVENIENCE OF READER.

THE UNIFIED SOIL CLASSIFICATION SYSTEM

MAJ. DIV.		LETTER	SYMBOL	NAME
COARSE GRAINED MATERIAL	GRAVEL AND GRAVELLY SOIL	GW		WELL GRADED GRAVEL OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GP		POORLY-GRADED GRAVEL OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GM		SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
		GC		CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOIL	SW		WELL-GRADED SAND OR GRAVELLY SAND, LITTLE OR NO FINES
		SP		POORLY GRADED SAND OR GRAVELLY SAND, LITTLE OR NO FINES
		SM		SILTY SAND, SAND SILT MIXTURES
		SC		CLAYEY SAND, SAND SILT MIXTURES

MAJ. DIV.		LETTER	SYMBOL	NAME
FINE GRAINED SOIL	SILTS AND CLAYS LL<50	ML		INORGANIC SILT AND VERY FINE SAND, ROCK FLOUR, SILT OR CLAYEY FINE SAND OR CLAYED SILT WITH SLIGHT PLASTICITY
		CL		INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAY, SANDY CLAY, SILTY CLAY, LEAN CLAY
		OL		ORGANIC SILT AND ORGANIC SILT-CLAY OF LOW PLASTICITY
	SILTS AND CLAYS LL>50	MH		INORGANIC SILT MICACEOUS OR DATOMACEOUS FINE SAND OR SILTY SOILS, ELASTIC SILT
		CH		INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY
		OH		ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILT
HIGHLY ORGANIC SOILS		PT		PERT AND OTHER HIGHLY ORGANIC SOILS

ROCK CLASSIFICATION	
SYMBOL	NAME
	IGNEOUS ROCK
	SEDIMENTARY ROCK
	METAMORPHIC ROCK

NOTE
CLASSIFICATION OF EARTH MATERIAL SHOWN ON THIS SHEET IS BASED ON FIELD INSPECTION UNLESS NOTED OTHERWISE.

STATE OF ALASKA 49TH
Ronald J. Relland
NO. 2073 E
REGISTERED PROFESSIONAL ENGINEER

CH2M HILL

DES. KRG
DR. RSF
CHK. JLB
APPD. RJR

NO.	DATE	REVISION	BY	APPD.

CITY OF HOMER, ALASKA
WATER SUPPLY IMPROVEMENTS

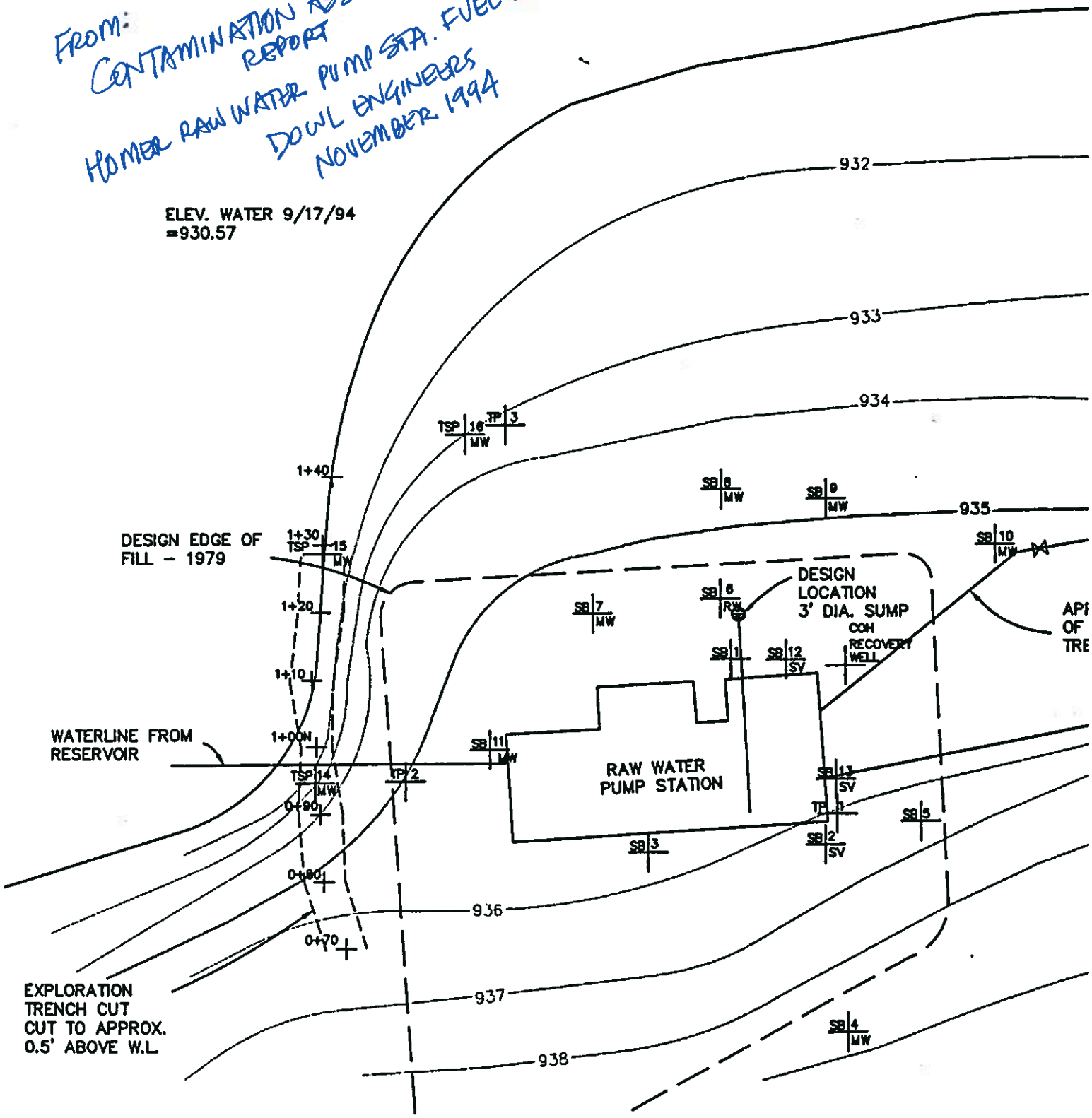
RAW WATER PUMP STATION AND TREATMENT PLANT EXPANSION

SOILS LOGS 00083

SHEET 9
OF
DATE AUG 1979
DWG. NO. KT2427-A1

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

FROM:
CONTAMINATION ASSESSMENT REPORT
HOMER RAW WATER PUMP STA. FUEL RELEASE
DOWL ENGINEERS
NOVEMBER 1994



Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-1 **ELEVATION** 935.2 FEET

GEOLOGIC LOG

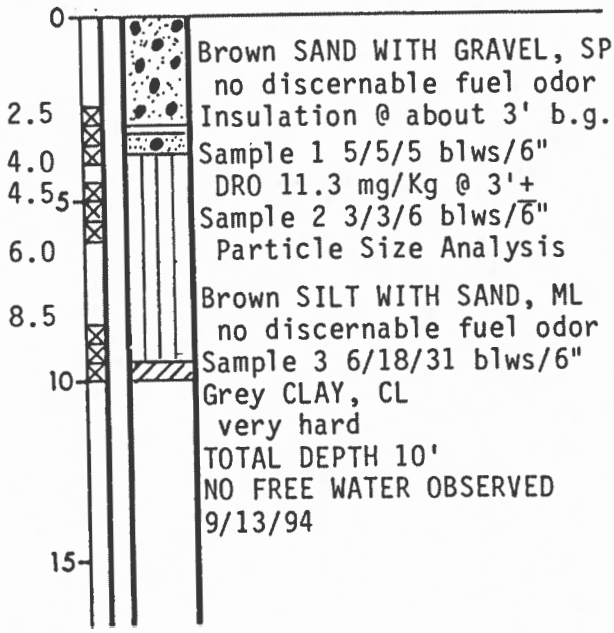
WELL DESCRIPTION

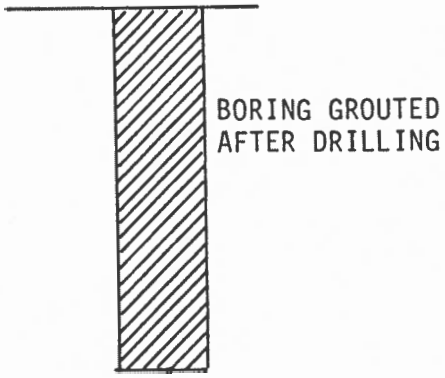
SOILS BORING ONLY

MEASURING POINT ELEV. N.A.

TYPE OF COMPLETION N.A.

DEPTH BELOW SURFACE





Notes:

1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer

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A DIVISION OF DOWL, INC.
F45015 OCTOBER, 1994
FIGURE C-1

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-2SV

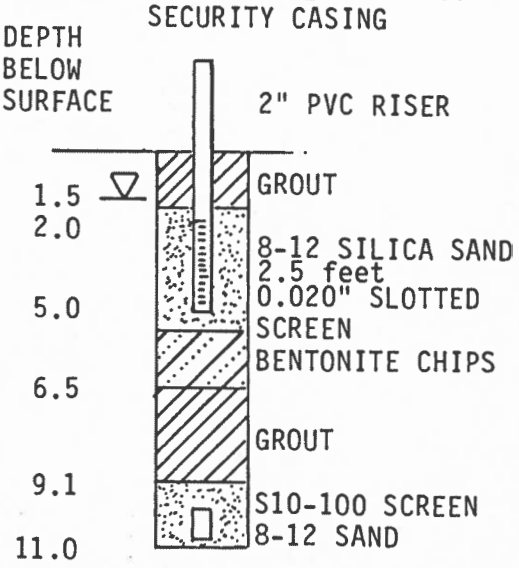
ELEVATION 935.5 FEET

GEOLOGIC LOG

WELL DESCRIPTION
SOIL VENT

MEASURING POINT ELEV. 937.51
TYPE OF COMPLETION ABOVE GROUND WITH OUT SECURITY CASING

DEPTH BELOW SURFACE		FIELD SCREEN
0	Brown SAND WITH GRAVEL, SP strong fuel odor	
3.0	Insulation @ 3.8' +	
4.5	SAMPLE 1 4/3/6 blws/6"	268 ppmV
5	SAMPLE 2 3/4/7 blws/6"	460 ppmV
6.5	DRO 25.5 mg/Kg, BTEX 1.6 mg/Kg	
7.5	Brown SILT to SILT W/ SAND, ML	
9.0	SAMPLE 3 3/9/22 blws/6"	97 ppmV
9.5	Grey CLAY, CL, very hard	
10	SAMPLE 4 6/17/21 blws/6"	4 ppmV
11.0	DRO 25.1 mg/Kg, BTEX N.D.	
	FREE WATER NOTED @ 3' WHILE DRILLING 9/13/94	
15		



FREE WATER OBSERVED
1.1 FT. Below Surface 10/10/94
NO FREE FUEL OBSERVED
2.25 FT. Below Surface 10/23/94

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer
4. Elev. Datum TBM Pump House Floor 935.70 Assumed

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FIGURE C-2

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-3MW

ELEVATION 936.1 FEET

GEOLOGIC LOG

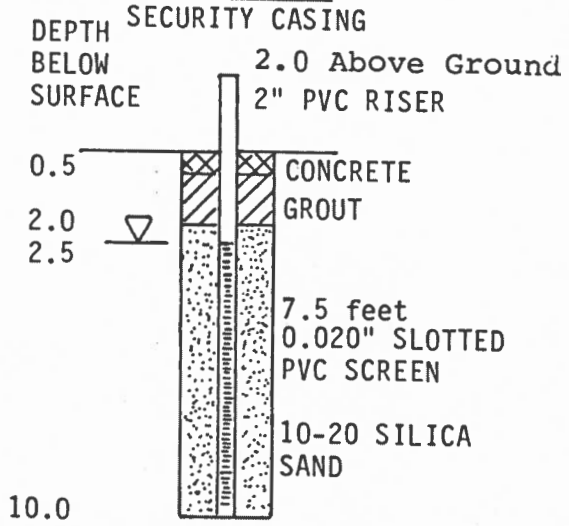
DEPTH BELOW SURFACE		FIELD SCREEN ppmV bag/jar
0	Brown SAND WITH GRAVEL, SP no discernable fuel odor	
2.5	SAMPLE 1 2/2/7 blws/6" DRO 25.1 mg/Kg, BTEX N.D.	6.5/9.5
4.0		
4.5	SAMPLE 2 2/4/12 blws/6" Particle Size Analysis	7.0/3.7
	Brown SILT, ML	
8.5		
	SAMPLE 3 7/15/21 blws/6"	3.5/2.1
10	Grey CLAY, CL very hard	
	TOTAL DEPTH 10'	
	WET @ 3' WHILE DRILLING 9/14/94	
15		

WELL DESCRIPTION

MONITORING WELL

MEASURING POINT ELEV. 938.11

TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING



FREE WATER OBSERVED
3.0' below surface 9/27/94
2.6' below surface 10/10/94
3.2' below surface 10/23/94

Measured Casing and Screen after development 11.76'

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer
4. Elev. Datum TBM Pump House Floor 935.7 Assumed
5. Well installed w/ 4.25"x 8" Hollow Stem Auger
6. Developed by Bailing

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FIGURE C-3

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-4MW

ELEVATION 936.1 FEET

GEOLOGIC LOG

WELL DESCRIPTION
MONITORING WELL

MEASURING POINT ELEV. 938.63
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING

DEPTH BELOW SURFACE

FIELD SCREEN ppmV bag/jar

0

Brown SILT WITH SAND, ML

4.0
5.5 5

SAMPLE 1 7/8/16 blws/6" 4.5/1.9
DRO 24.0 mg/Kg BTEX N.D.

Grey CLAY, CL
very hard

8.5
10

SAMPLE 2 11/25/38 blws/6" 2.9/4.3

TOTAL DEPTH 10'
9/14/94

15

DEPTH BELOW SURFACE

0.5
2.0
2.5

2.5' Above Grnd.
2"PVC RISER
CONCRETE GROUT
7.5 feet 0.020" SLOTTED PVC SCREEN
10-20 SILICA SAND

10.0

FREE WATER OBSERVED
3.6' below surface 9/27/94
1.9' below surface 10/10/94
2.0' below surface 10/23/94

Measured Casing and Screen after development 12.34'

Notes:
1. Soil Descript
changes may
2. Water levels
seasonally ar
3. Samples
driven w
4. Elev.
Floor
5. Well i
Hollow
6. Develo

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OCTOBER, 1994
RE C-4

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

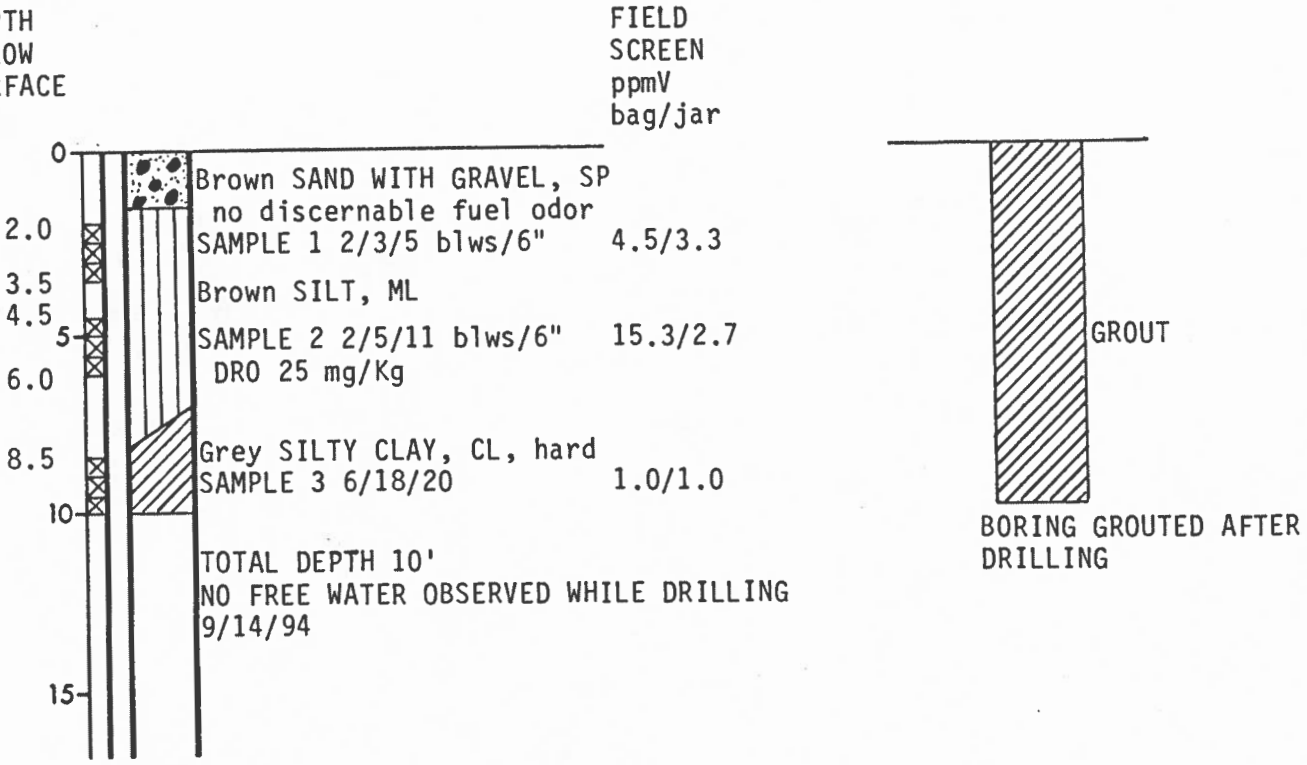
BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-5 **ELEVATION** 934.8 FEET

GEOLOGIC LOG

WELL DESCRIPTION

SOILS BORING
MEASURING POINT ELEV. N.A.
TYPE OF COMPLETION N.A.



Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer

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F45015 OCTOBER, 1994
FIGURE C-5

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-6RW **ELEVATION** 934.9 FEET

GEOLOGIC LOG

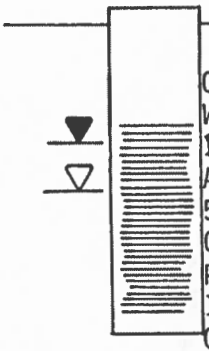
DEPTH BELOW SURFACE		FIELD SCREEN ppmV bag/jar
0	Brown SAND WITH GRAVEL, SP strong fuel odor	
2.5	SAMPLE 1 4/3/6 blws/6"	500/101
4.0	Particle Size Analysis	
4.5	SAMPLE 2 8/8/5 blws/6"	700/864
6.0		
6.5	SAMPLE 3 4/3/3 blws/6"	---/1111
8.0	DRO 109 mg/Kg BTEX 3.4 mg/Kg	
8.5	SAMPLE 4 4/2/9 blws/6"	23/30
10	Grey CLAY, CL WITH COAL	
11.0	hard	
12.5	SAMPLE 5 12/28/24 blws/6"	16.7/29.6
	DRO 39.6 mg/Kg BTEX 0.08	
15	TOTAL DEPTH 12.5'	
	ORIGINALLY COMPLETED AS MONITORING WELL 9/14/94	
	REINSTALLED AS RECOVERY WELL 9/15/94	

WELL DESCRIPTION

RECOVERY WELL

MEASURING POINT ELEV. 935.10

TYPE OF COMPLETION ABOVE GROUND WITHOUT SECURITY CASING



DEPTH BELOW SURFACE

0.4' Above Grnd.

ORIGINAL MONITORING WELL REDRILLED WITH 10 " O.D. AUGER AND 5.0' of 8" 0.020 SLOTTED PVC SCREEN INSTALLED USING OPEN HOLE TECHNIQUE

3.1 FREE FUEL OBSERVED
3.3' below surface 9/15/94
2.6' below surface 9/16/94
FREE WATER OBSERVED
4.5' below surface 9/15/94
4.0' below surface 9/16/94

8.1 FREE WATER OBSERVED WITH SURFICIAL THIN LAYER OF FUEL (0.01' or less)
8.8 3.5' below surface 10/23/94

Measured Casing and Screen after development 8.61'

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer
4. Elev. Datum TBM Pump House Floor 935.7' Assumed
5. Well installed using open hole technique w/ 10" O.D. Auger
6. Well developed by pumping

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FIGURE C-6

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-7MW **ELEVATION** 935.2 FEET

GEOLOGIC LOG

WELL DESCRIPTION
MONITORING WELL

MEASURING POINT ELEV. 934.82
TYPE OF COMPLETION AT GRADE WITH ROBCO MONITORING WELL MON.

DEPTH BELOW SURFACE		FIELD SCREEN ppmV bag/jar
0	Brown SAND WITH GRAVEL, SP	
2.0	Brown ORGANIC SILT, OL	
3.5	no discernable odor	
4.5	SAMPLE 1 7/11/12 blws/6"	4.3/7.2
5	SAMPLE 2 3/7/12 blws/6"	18.8/16.3
6.0	DRO ND, BTEX ND	
	Brown SANDY CLAY, CL	
8.5	hard with grey mottling belw	
	below 6', trace coal	
10	SAMPLE 3 4/7/16	9.7/6.8
	TOTAL DEPTH 10'	
	9/15/94	
15		

DEPTH BELOW SURFACE	
0.5	CONCRETE
	GROUT
1.8	2" PVC RISER
2.5	7.0 feet
	0.020 " SLOTTED PVC SCREEN
	10-20 SILICA SAND
9.5	

FREE WATER OBSERVED
4.5' below surface 9/27/94
4.2' below surface 10/10/94
4.3' below surface 10/23/94

Measured Casing and Screen after development 9.31'

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer
4. Elev. Datum TBM Pump House Floor 935.7' Assumed
5. Well installed w/ 4.25"x8" Hollow Stem Auger
6. Developed by Bailing

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FIGURE C-7

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

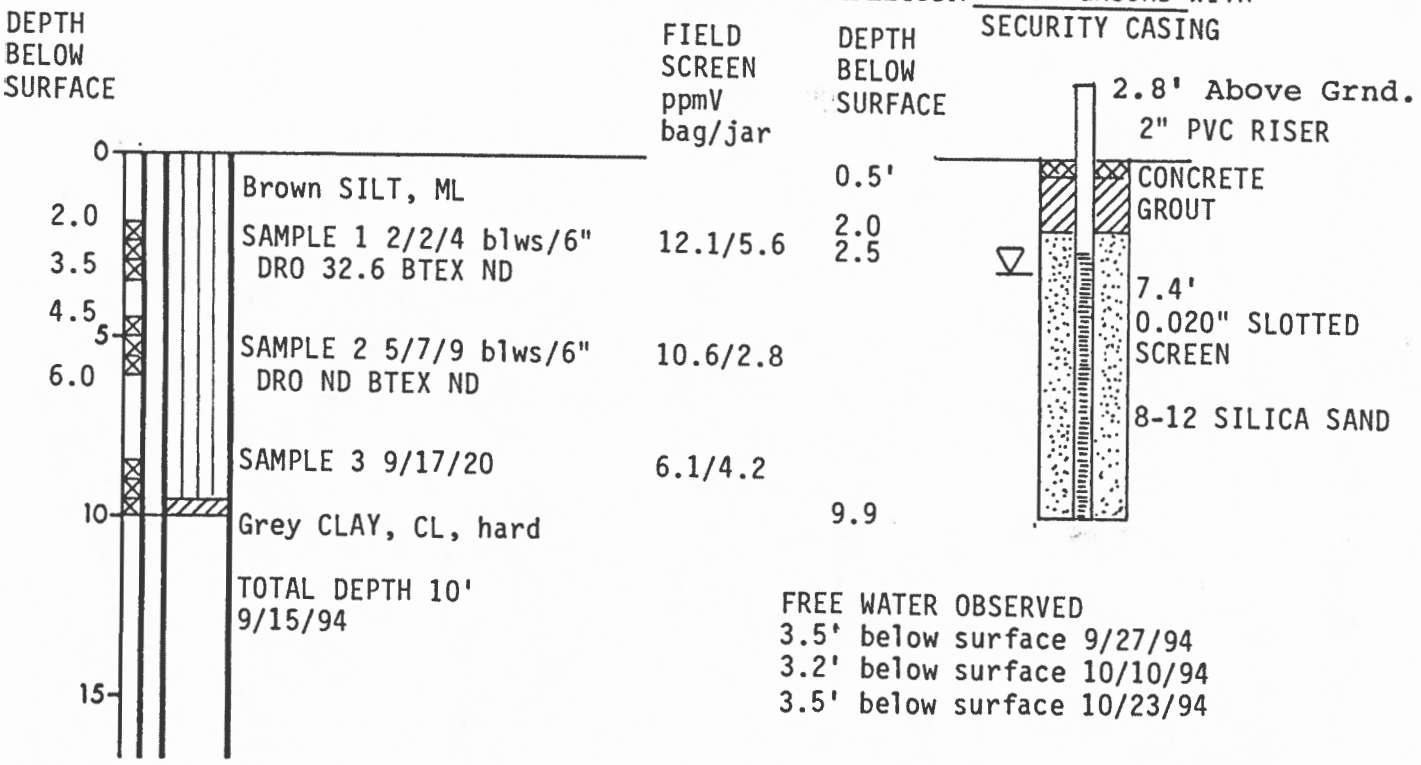
BORING NUMBER SB-8MW

ELEVATION 934.5 FEET

GEOLOGIC LOG

WELL DESCRIPTION
MONITORING WELL

MEASURING POINT ELEV. 937.27
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING



FREE WATER OBSERVED
3.5' below surface 9/27/94
3.2' below surface 10/10/94
3.5' below surface 10/23/94

Measured Casing and Screen after development 12.37'

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer
4. Elev. Datum TBM Pump House Floor 935.7' Assumed
5. Well installed w/ 4.25"x8" Hollow Stem Auger
6. Developed by Bailing

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FIGURE C-8

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

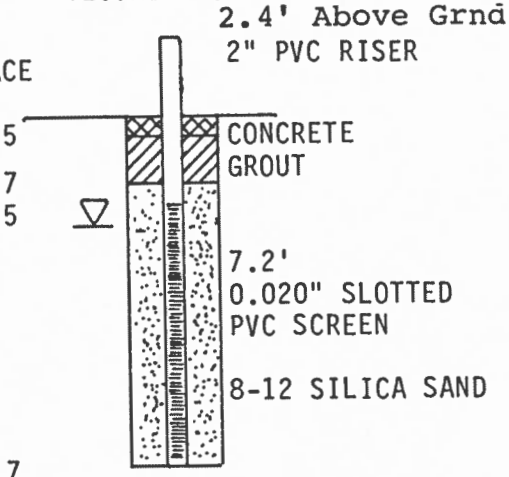
BORING NUMBER SB-9MW **ELEVATION** 934.5 FEET

GEOLOGIC LOG

DEPTH BELOW SURFACE		FIELD SCREEN ppmV bag/jar
0	Brown SILT, ML w/ organic	
2.0	Brown SILT, ML	
3.5	SAMPLE 1 2/4/6 blws/6"	4.1/3.9
4.5 5		
6.0	SAMPLE 2 4/7/8 DRO ND BTEX ND	6.8/6.5
8.5	Grey CLAY, CL hard	
10	SAMPLE 3 14/17/23 blws/6"	6.3/3.8
	TOTAL DEPTH 10' 9/15/94	
15		

WELL DESCRIPTION
MONITORING WELL

MEASURING POINT ELEV. 936.85
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING



DEPTH BELOW SURFACE	
0.5	
1.7	
2.5	▽
9.7	

FREE WATER OBSERVED
3.2' below surface 9/27/94
3.0' below surface 10/10/94
3.4' below surface 10/23/94

Measured Casing and Screen after development 12.21'

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer.
4. Elev. Datum TBM Pump House Floor 935.7' Assumed
5. Well installed w/ 4.25"x8" Hollow Stem Auger
6. Developed by Bailing

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FIGURE C-9

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

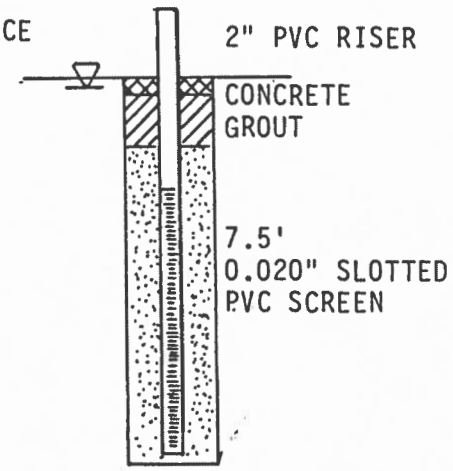
BORING NUMBER SB-10MW ELEVATION 933.7 FEET

GEOLOGIC LOG

WELL DESCRIPTION
MONITORING WELL

MEASURING POINT ELEV. 936.36
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING

DEPTH BELOW SURFACE		FIELD SCREEN ppmV
0	Brown MIXED FILL-SAND & SILT	
2.0	SAMPLE 1 2/3/6 blws/6"	1.9/3.1
3.5	DRO 45.5	
	Brown SILTY SAND, SP-SM, FILL	
5	Grey CLAY W/ PEAT AND SAND, FILL	
	SAMPLE 2 1/2/3	8.0/1.7
6.5	DRO 51.6 BTEX ND	
	Brown SANDY CLAY, CL	
8.5	SAMPLE 3 6/15/27	7.0/2.4
	Grey CLAY, CL, hard	
10		
	TOTAL DEPTH 10'	
	9/16/94	
15		



DEPTH BELOW SURFACE	
0.5	
1.7	
2.8	
10.3	

FREE WATER OBSERVED
0.7' below surface 9/27/94
0.3' below surface 10/10/94
1.3' below surface 10/23/94

Measured Casing and Screen after development 12.72

Notes:
1. Soil Descriptions are inter
changes may be gradual
2. Water levels are for dates
seasonally and annually
3. Samples taken wit
driven with 140
4. Elev. Datum T
Floor 935.7' Assume
5. Developed by Bailing

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CTOBER, 1994
-10

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-11MW

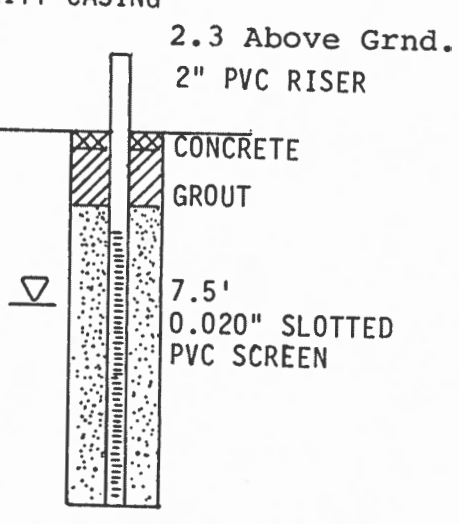
ELEVATION 935.4 FEET

GEOLOGIC LOG

WELL DESCRIPTION
MONITORING WELL

MEASURING POINT ELEV. 937.70
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING

DEPTH BELOW SURFACE		FIELD SCREEN ppmV
0	Brown SILTY SAND, SM	
2.0		
3.5	SAMPLE 1 4/4/4 blws/6" DRO ND BTEX ND	12.6/9.4
4.5		
5		
6.0	SAMPLE 2 3/5/7 blws/6" DRO 33.2 BTEX ND	18/0.6
8.5		
10	SAMPLE 3 1/1/1 blws/6"	10.5/0.5
	TOTAL DEPTH 10' PARTICLE SIZE ANALYSIS ON COMBINED SAMPLES 9/16/94	
15		



FREE WATER OBSERVED
5.2' below surface 9/16/94
4.8' below surface 9/27/94
4.7' below surface 10/10/94
4.9' below surface 10/23/94

Measured Casing and Screen after development 11.46

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer
4. Elev. Datum TBM Pump House Floor 935.7' Assumed
5. Well installed w/ 4.25"x8" Hollow Stem Auger
6. Developed first with pump then by bailing

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F45015 OCTOBER, 1994
FIGURE C-11

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-12SV

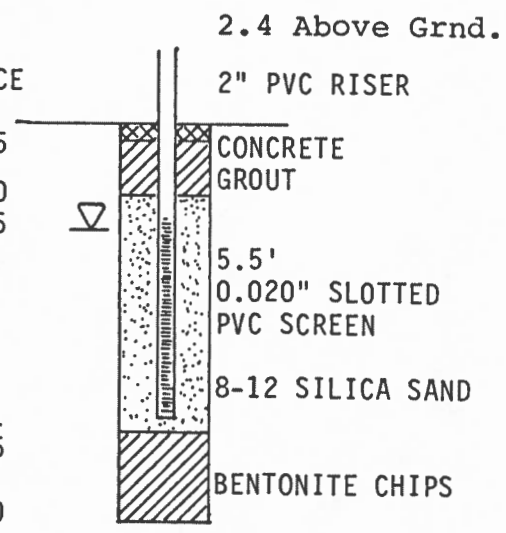
ELEVATION 935.3 FEET

GEOLOGIC LOG

WELL DESCRIPTION
SOIL VENT

MEASURING POINT ELEV. 937.64
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING

DEPTH BELOW SURFACE		FIELD SCREEN ppmV
0	Brown SAND WITH GRAVEL, SP	
	Insulation	
2.5	SAMPLE 1 3/4/4 blws/6"	
4.0	DRO 1940 BTEX 85.8	726/774
5	Brown/Grey SILT, ML	
	Grey SAND WITH GRAVEL, SP	
6.5	SAMPLE 2 5/6/8 blws/6"	466/675
7.5	Brown CLAY, CL, hard	
9.0	SAMPLE 3 6/14/17 blws/6"	23.3/18.8
9.5	Grey CLAY, CL hard	
10	SAMPLE 4 4/15/17 blws/6"	12.9/9.4
11.0	DRO 36.6 BTEX N.D.	
	TOTAL DEPTH 11'	
	9/16/94	
15		



FREE WATER OBSERVED
3.5' below surface on 9/27/94
2.9' below surface on 10/10/94
3.6' below surface on 10/23/94

Measured Casing and Screen
10.43'

Notes:
1. Soil Descriptions are interpretive and actual changes may be gradual
2. Water levels are for dates shown and may vary seasonally and annually
3. Samples taken with 3" O.D. Spoon driven with 140 lb. hammer.
4. Elev. Datum TBM Pump House Floor 935.7' Assumed
5. Soil Vent installed w/ 4.25x8" Hollow Stem Auger
6. Soil Vent not developed

LAMBE ENGINEERS
A DIVISION OF DOWL, INC.
F45015 OCTOBER, 1994
FIGURE C-12

Lambe Engineers. 1994. ***Contamination Assessment Report, Homer Raw Water Pump Station Fuel Release.***

BORING LOG AND WELL CONSTRUCTION DATA

BORING NUMBER SB-13SV

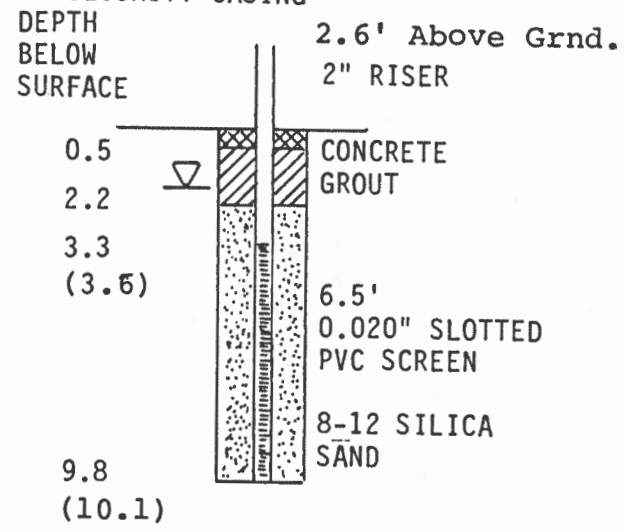
ELEVATION 935.3 FEET

GEOLOGIC LOG

WELL DESCRIPTION
SOIL VENT

MEASURING POINT ELEV. 937.87
TYPE OF COMPLETION ABOVE GROUND WITH SECURITY CASING

DEPTH BELOW SURFACE		FIELD SCREEN ppmV
0	Brown SAND WITH GRAVEL, SP strong fuel odor	
2.0	SAMPLE 1 8/12/12	Insuf. Recovery
3.5		
4.5		
5	SAMPLE 1 4/6/8 blws/6"	Insuf. Recovery
6.0		
7.0		
8.5	SAMPLE 2 5/12/12 blws/6"	186/215
9.5	Grey CLAY, CL, hard	
10		
11.0	SAMPLE 3 9/13/21 blws/6" DRO 25.5, BTEX N.D.	2.4/2.3
	TOTAL DEPTH 11' 9/16/94	
15	6" to 10" SAMPLE RECOVERY ALL ATTEMPTS	

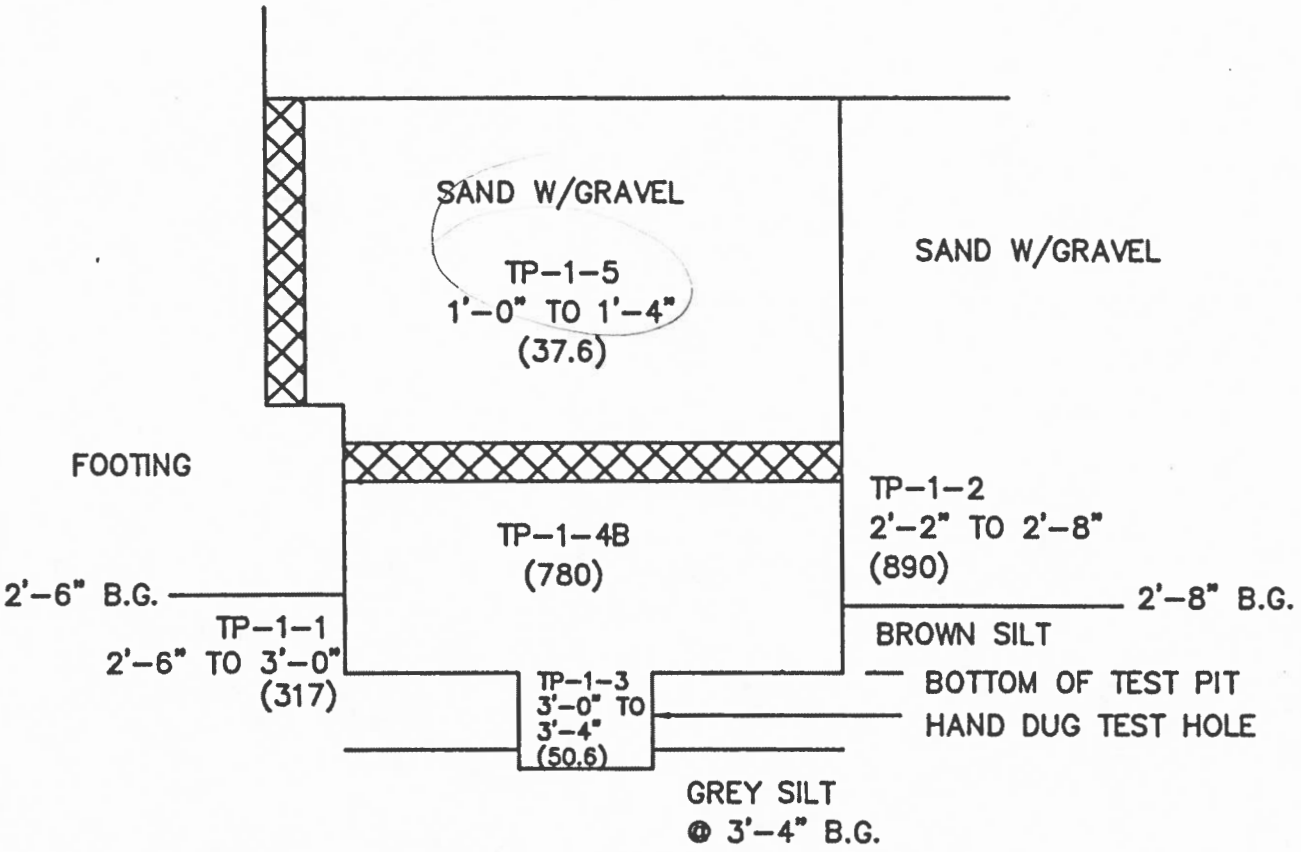


FREE WATER OBSERVED
2.1' below surface on 9/27/94
1.8' below surface on 10/10/94
2.6' below surface on 10/23/94

Measured Casing and Screen After Development 12.68'

Notes:
1. Soil Descriptions are inter
changes may be gradual
2. Water levels are for dates s
seasonally and annually
3. Samples taken with
driven with 140 lb
4. Elev. Datum TBM
Floor 935.7' Ass
5. Soil Vent instal
8" Hollow Stem Auger
6. Soil Vent Developed w/ B.K. Pump

GINEERS
OWL, INC.
OBER, 1994
FIGU -13



NOTE: NUMBER IN PARENTHESIS IS FIELD SCREEN RESULT FROM PID HEAD SPACE PROCEDURE

WATER ENTERING TEST PIT @ 2'-8" ABOVE SILT LAYER

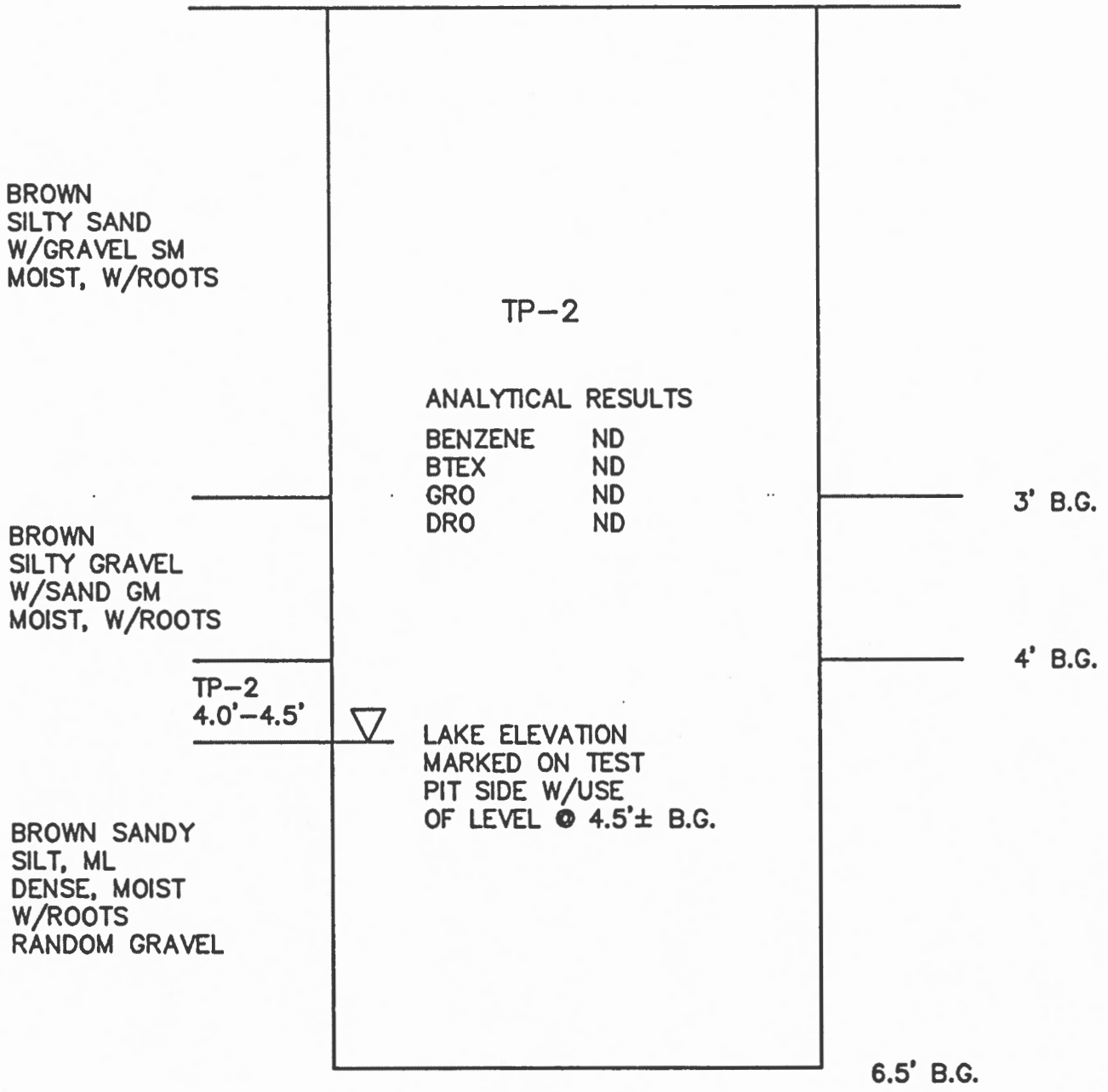
SAMPLE TEST RESULTS mg/kg

SAMPLE	BENZENE	BTEX	GRO	DRO
TP-1-1	ND	0.45	2.00	9.69
TP-1-2	ND	133.80	614	2990
TP-1-3	0.01	0.06	ND	ND
TP-1-4B	ND	64	667	2660

LOG OF TEST PIT 1
BETWEEN SB-2SV & SB-13SV
SOUTH EAST CORNER OF BUILDING
NOT TO SCALE

FIGURE C-14

LAMBE ENGINEERS
A DIVISION OF DOWL, INCORPORATED
PHONE (907) 262-5611 FAX (907) 262-5615



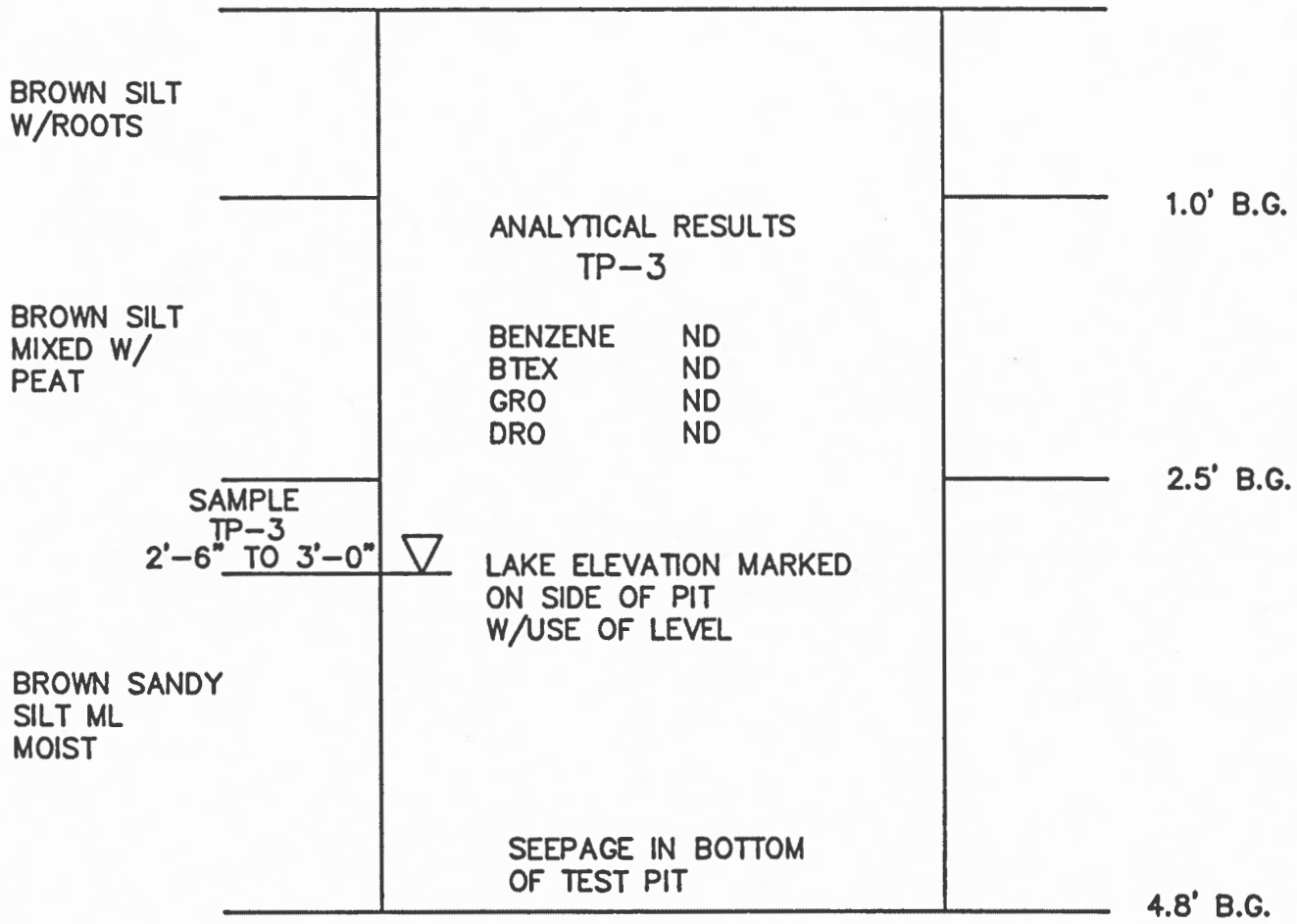
NOTE: NO SEEPAGE OBSERVED IN TEST PIT WALLS

LOG OF TEST PIT 2

NOT TO SCALE

FIGURE C-15

LAMBE ENGINEERS
A DIVISION OF DOWL, INCORPORATED
PHONE (907) 262-5611 FAX (907) 262-5615



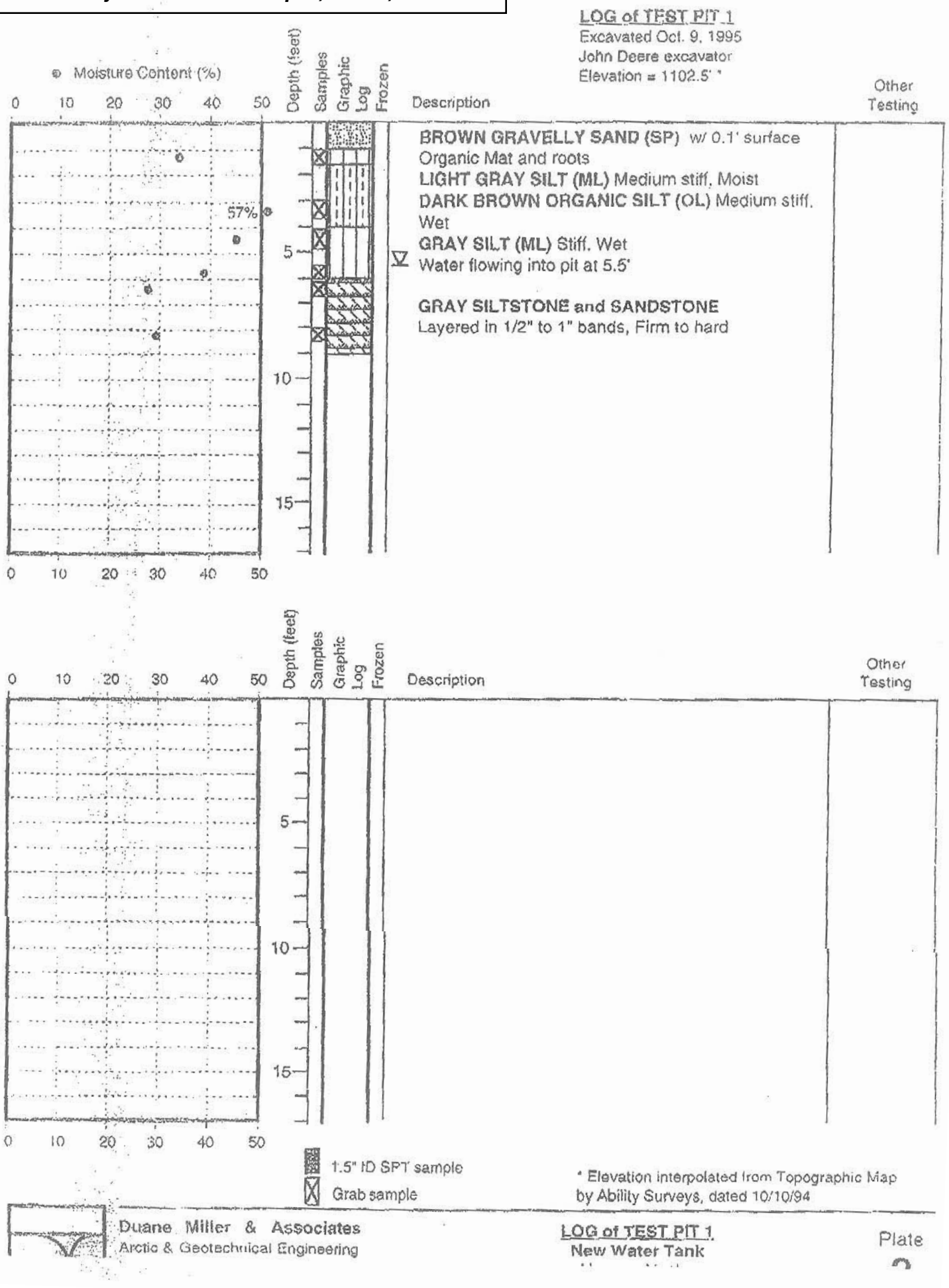
LOG OF TEST PIT 3

NOT TO SCALE

FIGURE C-16

LAMBE ENGINEERS
A DIVISION OF DOWL, INCORPORATED
PHONE (907) 262-5611 FAX (907) 262-5615

CH2M Hill. 2002. ***1.0 Million Gallon Water Storage Improvement Project Geotechnical Report, Homer, Alaska.***



CH2MHILL

PROJECT NUMBER: 164257.B1.01 **TEST PIT NUMBER:** TP-1
Sheet: 1 of 1

TEST PIT LOG

PROJECT: HOMER TANK **LOCATION:** LOT 34
CONTRACTOR: CITY OF HOMER **DATE EXCAVATED:** 06/11/02
EXCAVATION EQUIPMENT: JOHN DEERE 410D RUBBER-TIRED BACKHOE
WATER LEVEL: SEEPAGE @ 10.5 FT **SURFACE ELEVATION:** ~1104 FT **LOGGER:** KSM

DEPTH BELOW GROUND SURFACE, FT	SAMPLE NUMBER	SAMPLE TYPE	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
0			Ground Surface	
			SANDY SILT W/ ORGANICS (ML) Dark brown, moist, stiff	
1				Easy excavation to 7 feet with roots to 2 feet
2	S-1	GRAB	**SANDY SILT (ML)** Mottled brown and gray, moist, firm	
3				
4				
5	S-2	GRAB	**SANDY SILT (ML)** Light brown, moist, stiff	
6				
7				
	S-3	GRAB	**SILTY SAND (SM)** Gray, moist, loose to medium dense	Excavation slightly more difficult at 7 feet
8				
9				
10				Seepage at top of bedrock (10.5 feet)
			BEDROCK Mottled red and black mudstone, platy, weathered (Kenai Formation)	Backhoe able to excavate into bedrock with some difficulty
11				Bottom of Excavation at 10.5 feet
12				
13				
14				
15				

CH2M Hill. 2002. ***1.0 Million Gallon Water Storage Improvement Project Geotechnical Report, Homer, Alaska.***

CH2MHILL

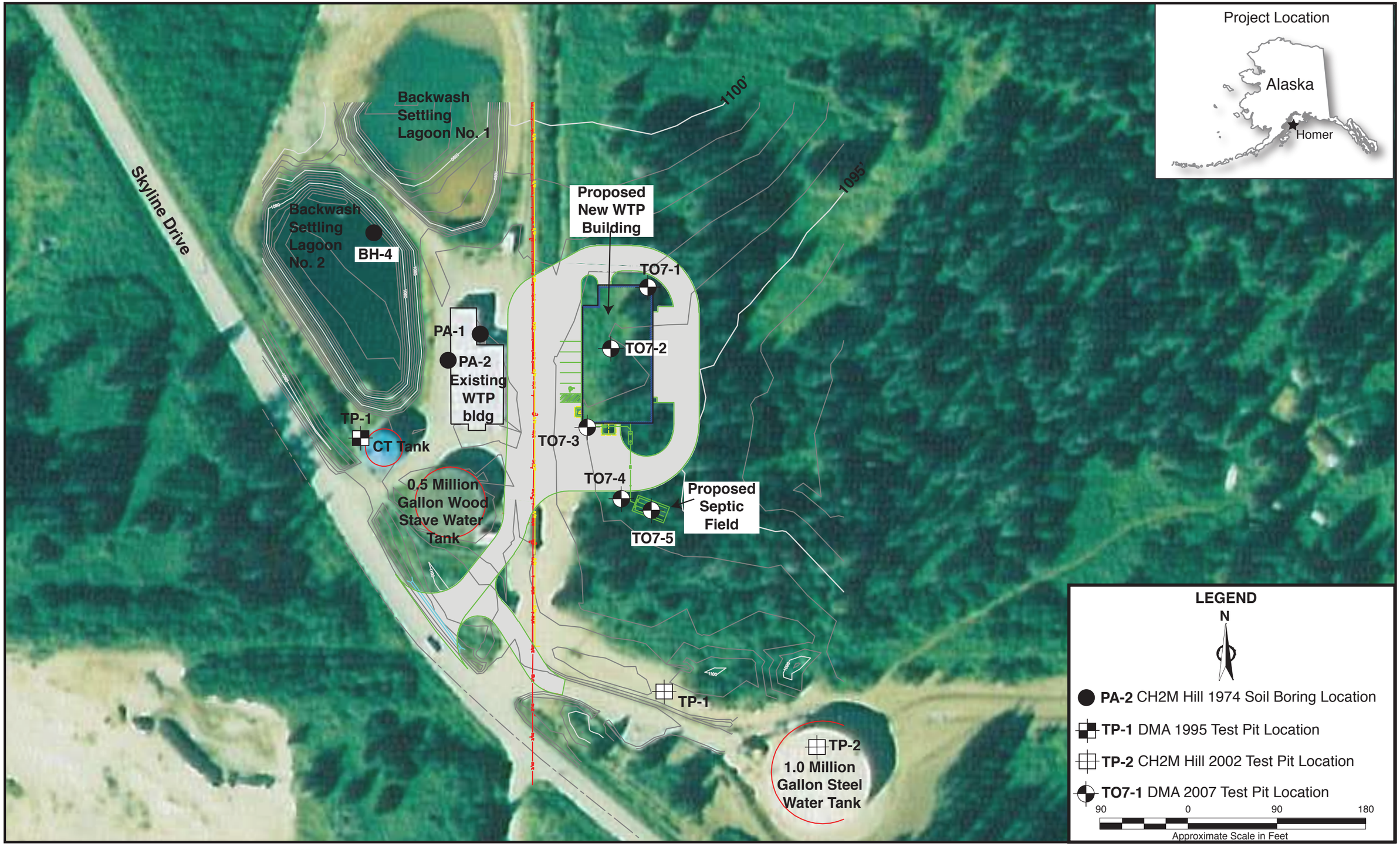
PROJECT NUMBER: 164257.B1.01 **TEST PIT NUMBER:** TP-2
Sheet: 1 of 1

TEST PIT LOG

PROJECT: HOMER TANK **LOCATION:** LOT 34
CONTRACTOR: CITY OF HOMER **DATE EXCAVATED:** 06/11/02
EXCAVATION EQUIPMENT: JOHN DEERE 410D RUBBER-TIRED BACKHOE
WATER LEVEL: SEEPAGE @ 11.5 FT **SURFACE ELEVATION:** ~1101 FT **LOGGER:** KSM

DEPTH BELOW GROUND SURFACE, FT	SAMPLE NUMBER	SAMPLE TYPE	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DIFFICULTY IN EXCAVATION, RUNNING GRAVEL CONDITION, COLLAPSE OF WALLS, SAND HEAVE, DEBRIS ENCOUNTERED, WATER SEEPAGE, GRADATIONAL CONTACTS, TESTS, INSTRUMENTATION
0			Ground Surface	
0–1			**SILT W/ SAND (ML)** Dark brown, moist, soft, with organics and roots	
1–2			**SANDY SILT (ML)** Light brown, moist, firm	
3–4	S-1	GRAB	**SANDY SILT (ML)** Light brown, moist, stiff	
5–9				Excavation relatively easy to bedrock at 11.5 feet
10–11	S-2	GRAB	**SILTY SAND TO SANDY SILT (SM-ML)** Gray, moist, loose to medium dense, slightly plastic	
11				Seepage at top of bedrock (11.5 feet)
12			**BEDROCK** Dark grey to black mudstone with coal fragments, platy, weathered (Kenai Formation)	Excavation difficult in weathered bedrock
13				Bottom of Excavation at 11.5 feet
14–15				

CH2M Hill. 2002. ***1.0 Million Gallon Water Storage Improvement Project Geotechnical Report, Homer, Alaska.***



Note: Aerial photograph provided by AERO-METRIC INC., 08/10/2003.

Duane Miller Associates LLC
Job No.: 4086.070
Date: June 2007

Duane Miller Associates. 2007. ***Geotechnical Recommendations Technical Memorandum 2007 Water Treatment Plant Project, Homer Alaska. Addressed to HDR.***

PROJECT LOCATION MAP
Water Treatment Plant
Homer, Alaska

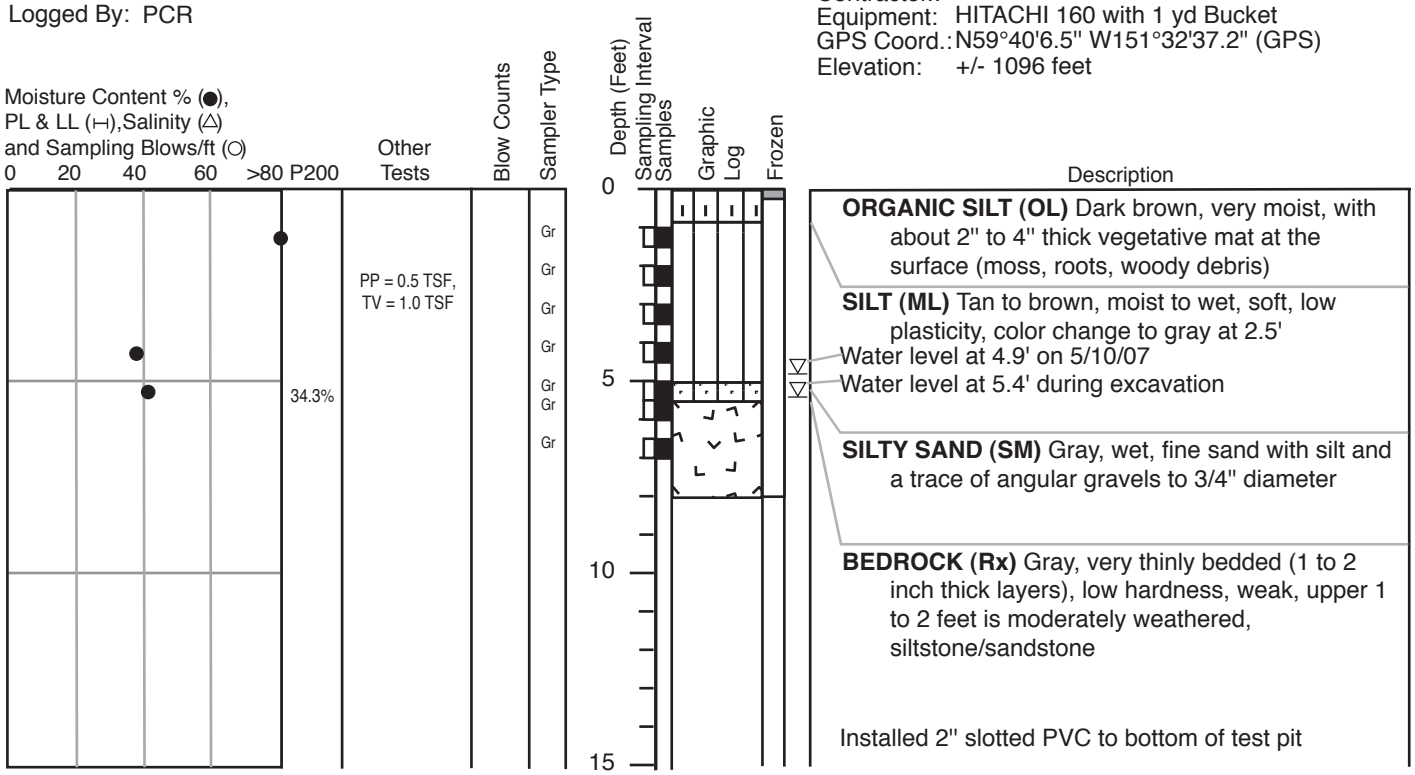
Plate
1

DUANE MILLER ASSOCIATES LLC

Project: Homer WTP
DMA Job No.: 4086.070
Logged By: PCR

Log of HOLE: T07-1

Date Drilled: May 4, 2007
Contractor.: COAST RANGE
Equipment: HITACHI 160 with 1 yd Bucket
GPS Coord.: N59°40'6.5" W151°32'37.2" (GPS)
Elevation: +/- 1096 feet

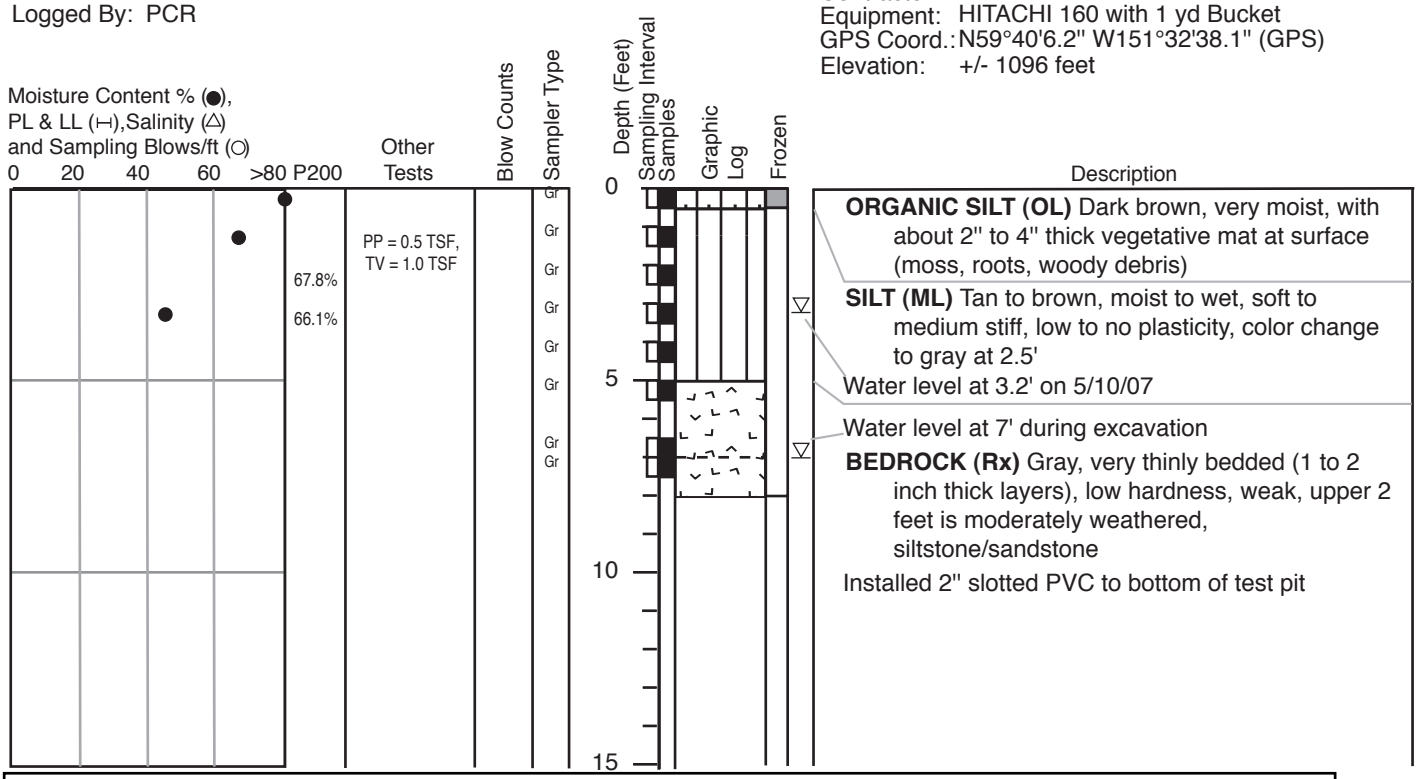


DUANE MILLER ASSOCIATES LLC

Project: Homer WTP
DMA Job No.: 4086.070
Logged By: PCR

Log of HOLE: T07-2

Date Drilled: May 4, 2007
Contractor.: COAST RANGE
Equipment: HITACHI 160 with 1 yd Bucket
GPS Coord.: N59°40'6.2" W151°32'38.1" (GPS)
Elevation: +/- 1096 feet



Duane Miller Associates. 2007. ***Geotechnical Recommendations Technical Memorandum 2007 Water Treatment Plant Project, Homer Alaska. Addressed to HDR.***

Duane Miller Associates LLC
Job No.: 4086.070
Date: June 2007

LOG OF TEST PITS T07-1 AND T07-2

Water Treatment Plant
Homer, Alaska

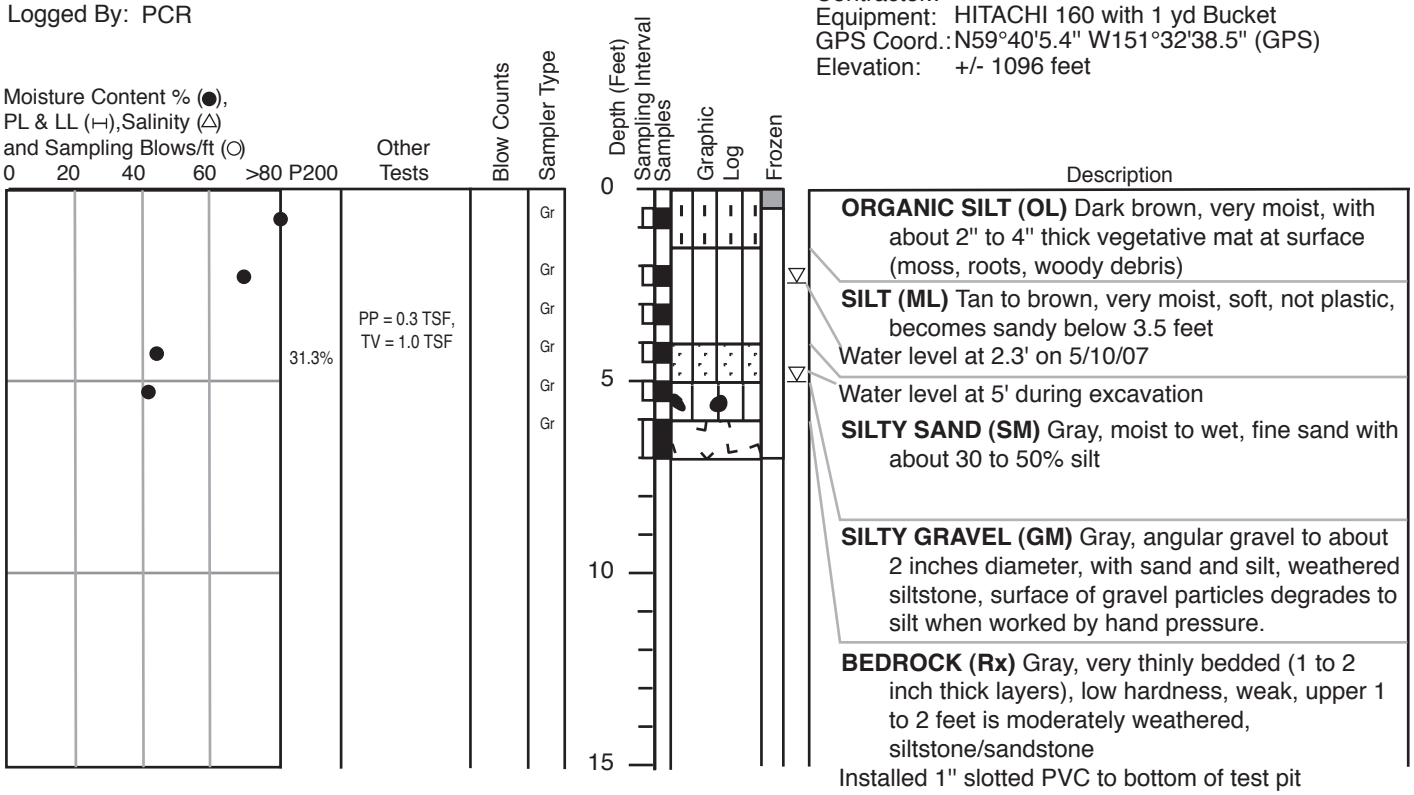
Plate
2

DUANE MILLER ASSOCIATES LLC

Project: Homer WTP
DMA Job No.: 4086.070
Logged By: PCR

Log of HOLE: T07-3

Date Drilled: May 4, 2007
Contractor.: COAST RANGE
Equipment: HITACHI 160 with 1 yd Bucket
GPS Coord.: N59°40'5.4" W151°32'38.5" (GPS)
Elevation: +/- 1096 feet



Description

ORGANIC SILT (OL) Dark brown, very moist, with about 2" to 4" thick vegetative mat at surface (moss, roots, woody debris)

SILT (ML) Tan to brown, very moist, soft, not plastic, becomes sandy below 3.5 feet

Water level at 2.3' on 5/10/07

Water level at 5' during excavation

SILTY SAND (SM) Gray, moist to wet, fine sand with about 30 to 50% silt

SILTY GRAVEL (GM) Gray, angular gravel to about 2 inches diameter, with sand and silt, weathered siltstone, surface of gravel particles degrades to silt when worked by hand pressure.

BEDROCK (Rx) Gray, very thinly bedded (1 to 2 inch thick layers), low hardness, weak, upper 1 to 2 feet is moderately weathered, siltstone/sandstone

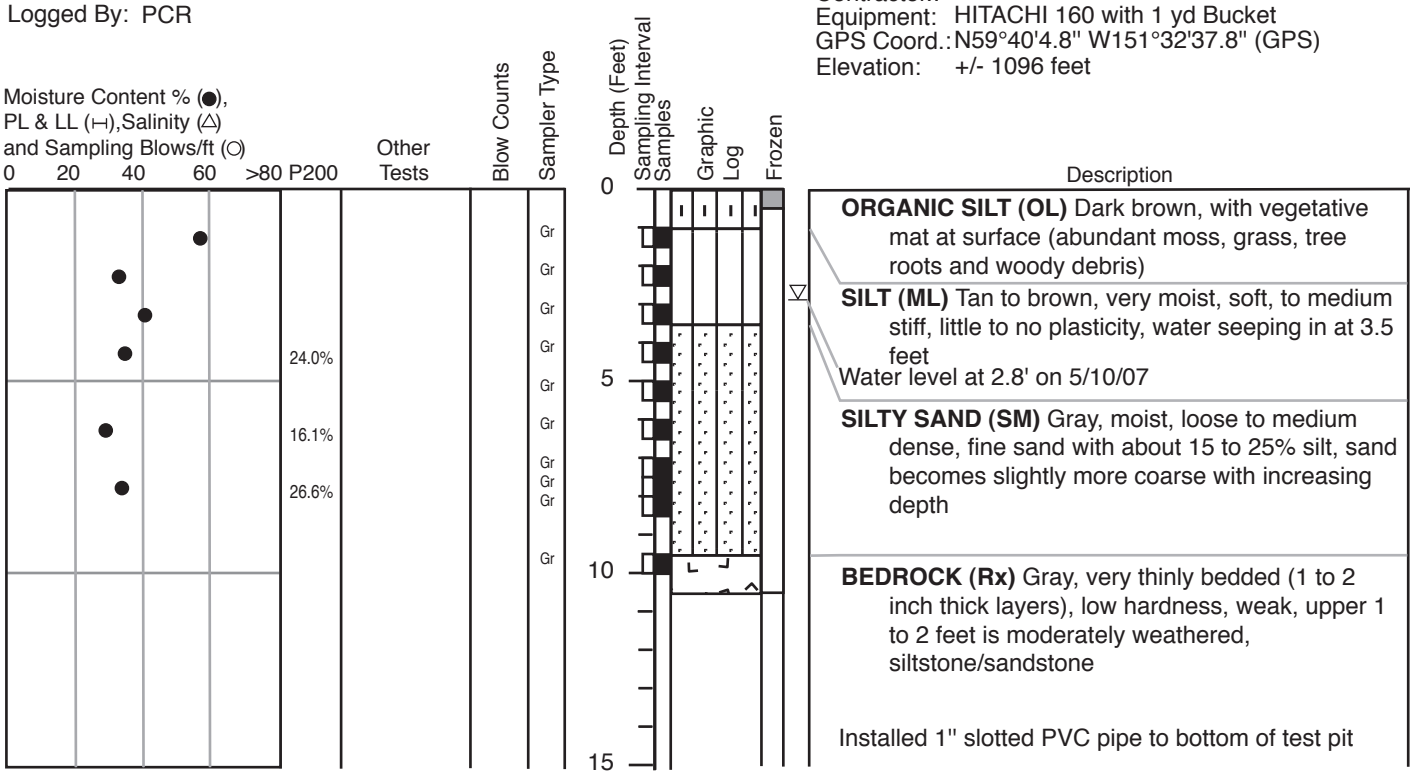
Installed 1" slotted PVC to bottom of test pit

DUANE MILLER ASSOCIATES LLC

Project: Homer WTP
DMA Job No.: 4086.070
Logged By: PCR

Log of HOLE: T07-4

Date Drilled: May 4, 2007
Contractor.: COAST RANGE
Equipment: HITACHI 160 with 1 yd Bucket
GPS Coord.: N59°40'4.8" W151°32'37.8" (GPS)
Elevation: +/- 1096 feet



Description

ORGANIC SILT (OL) Dark brown, with vegetative mat at surface (abundant moss, grass, tree roots and woody debris)

SILT (ML) Tan to brown, very moist, soft, to medium stiff, little to no plasticity, water seeping in at 3.5 feet

Water level at 2.8' on 5/10/07

SILTY SAND (SM) Gray, moist, loose to medium dense, fine sand with about 15 to 25% silt, sand becomes slightly more coarse with increasing depth

BEDROCK (Rx) Gray, very thinly bedded (1 to 2 inch thick layers), low hardness, weak, upper 1 to 2 feet is moderately weathered, siltstone/sandstone

Installed 1" slotted PVC pipe to bottom of test pit

Duane Miller Associates. 2007. ***Geotechnical Recommendations Technical Memorandum 2007 Water Treatment Plant Project, Homer Alaska. Addressed to HDR.***

Duane Miller Associates LLC
Job No.: 4086.070
Date: June 2007

LOG OF TEST PITS T07-3 AND T07-4
Water Treatment Plant
Homer, Alaska

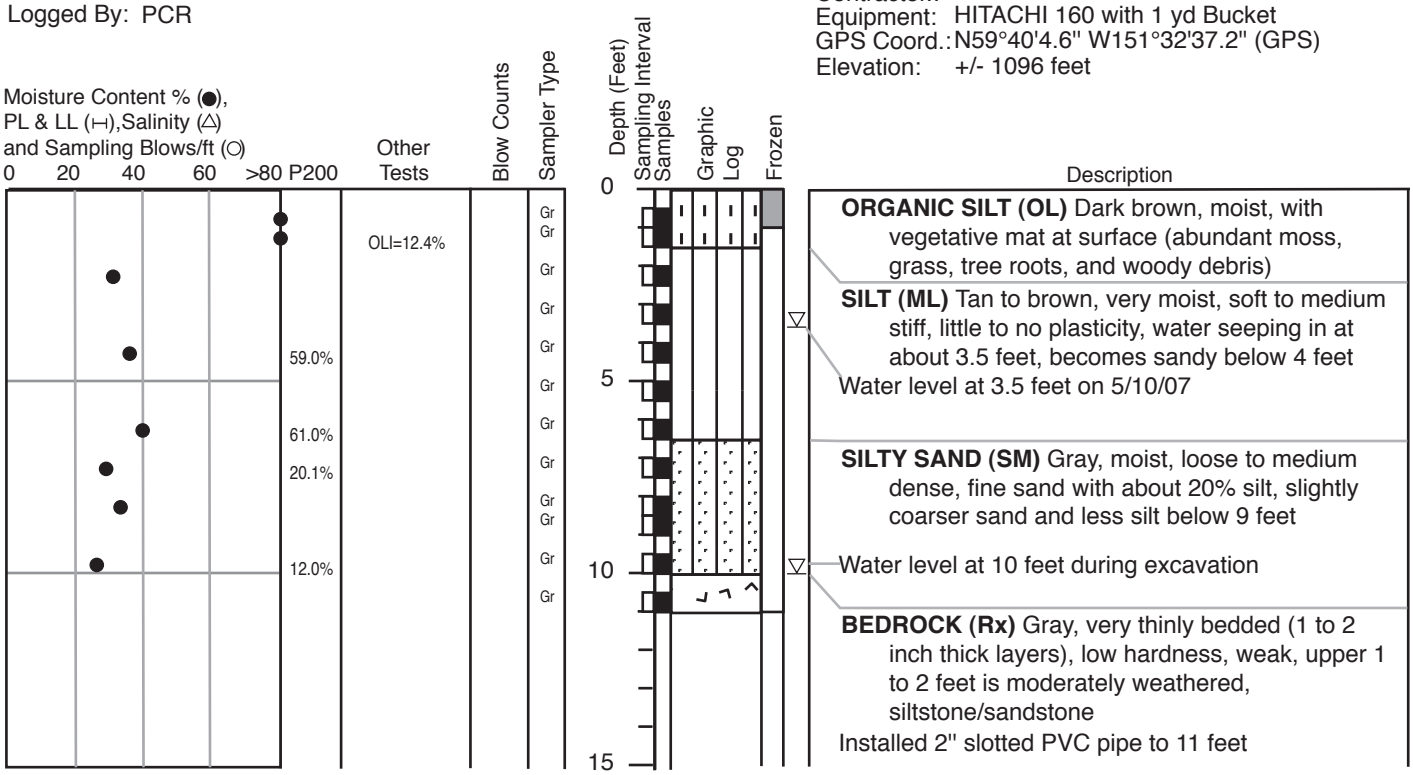
Plate
3

DUANE MILLER ASSOCIATES LLC

Project: Homer WTP
DMA Job No.: 4086.070
Logged By: PCR

Log of HOLE: T07-5

Date Drilled: May 4, 2007
Contractor.: COAST RANGE
Equipment: HITACHI 160 with 1 yd Bucket
GPS Coord.: N59°40'4.6" W151°32'37.2" (GPS)
Elevation: +/- 1096 feet



Duane Miller Associates. 2007. ***Geotechnical Recommendations Technical Memorandum 2007 Water Treatment Plant Project, Homer Alaska. Addressed to HDR.***

Alaska Department of Natural Resource
Well Log Tracking System (DNR WELTS).
2021.

33084

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
Alaska Hydrologic Survey

WATER WELL LOG Revised 08/18/2016

Drilling Started: ___/___/_____ Completed: 4 / 5 / 2008 Pump Install: ___/___/_____

City/Borough	Subdivision	Block	Lot	Property Owner Name & Address
HOMER	CRESTVIEW ESTATES		L02	T STAFFORD ,

Well location: Latitude _____ **Longitude** _____
Meridian S Township 006S Range 013W Section 7 , NE 1/4 of SW 1/4 of NE 1/4 of SE 1/4

BOREHOLE DATA: (from ground surface)
Suggest T.**M. Hanna's hydrogeologic classification system***
https://my.ngwa.org/NC__Product?id=a185000000BYub3AAD

	Depth From	Depth To

Include description or sketch of well location (include road names, buildings, etc.):

North

Drilling method: ☐ Air rotary, ☐ Cable tool, ☒ Other Auger
Well use: ☐ Public supply, ☐ Domestic, ☐ Reinjection, ☐ Hydrofracking
☐ Commercial, ☒ Observation/Monitoring, ☐ Test/Exploratory, ☐ Cooling,
☐ Irrigation/Agriculture, ☐ Grounding, ☐ Recharge/Aquifer Storage,
☐ Heating, ☐ Geothermal Exploration, ☐ Other _____
Fluids used: _____

Depth of hole: 110 ft Casing stickup: _____ft
Casing type: _____ Casing thickness: _____ inches
Casing diameter: _____ inches Casing depth: 18 ft
Liner type: _____ Depth: _____ ft Diameter: _____inches
Note: CASE TO 18 FT, PVC LINER TO BOTTOM, PERFS 100 FT -110 FT

Well intake opening type: ☐ Open end, ☐ Open hole, ☐ Other _____
Screen type: _____, Screen mesh size: _____
Screen start: _____ ft, Screen stop:_____ ft, Perforated ☐ Yes ☒ No
Perforation description:_____ Perf from: _____ ft, Perf to: _____ft, Perf from: _____ ft, Perf to: _____ ft
Gravel packed ☒ Yes ☐ No Gravel start: _____ ft , Gravel stop:_____ ft
Note: _____

Static water (from top of casing): 35 ft on___/___/_____ Artesian well ☐
Pumping level & yield: _____ feet after _____ hours at 6 gpm
Method of testing:_____
Development method:_____ Duration: _____
Recovery rate: _____ gpm

Grout type: _____ Volume _____
Depth: From _____ft, To _____ft

Final pump intake depth: _____ ft Model: _____
Pump size: _____ hp Brand name: _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: _____
Was water quality tested? ☐ Yes ☐ No
Water quality parameters tested: _____

Well driller name: .....
Company name: VANDEHEY WELL DRILLING.....
Mailing address:.....
City: _____ State: AK Zip: _____
Phone number: (_____) _____- _____
Driller's signature: _____
Date: _____/_____/_____

AS 41.08.020(b)(4) and AAC 11 AAC 93.140(a) require that a copy of the well log be submitted to the Department of Natural Resources within **45 days of well completion**. Well logs may be submitted using the online well log reporting system available at:

https://dnr.alaska.gov/welts/

OR email electronic well logs to

dnr.water.reports@alaska.gov

Anchorage Municipal Code 15.55.060(I) and North Pole Ordinance 13.32.030(D) require that a copy of this well log be submitted to the Development Services Department/City within **30 days of well completion**.

City Permit Number: _____
Date of Issue: _____/___/_____

Parcel Identification Number: _____-_____-_____

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

Alaska Department of Natural Resource
Well Log Tracking System (DNR WELTS).
2021.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
WATER WELL LOG

Drilling Started: 4/5/08 Completed: 4/5/08

City/Borough:	Subdivision:	BLOCK	LOT	Property Owner Name & Address: Tom Stafford
KPB / Homer	Crest View		2	109 Cozy Cove Dr. Homer, AK, 99603

Meridian _____ Township _____ Range _____ Section _____, ____ 1/4 of ____ 1/4 of ____ 1/4 of ____ 1/4

BOREHOLE DATA: (from ground surface) **Depth**

Material: Type, Color & wetness	From	To
Top Soil	0	2
gray clay	2	11
Brown Sand Stone	11	37
gray Sand Stone	37	40
Gray Clay 3gpm	40	42
Coal	42	43
gray clay	43	60
Coal	60	65
gray clay	65	73
Coal	73	74
gray clay	74	85
Coal	85	86
gray clay	86	105
Coal 3 gpm	105	107
gray clay	107	110

DEPT. OF NATURAL RESOURCES
DIV. OF MINING, LAND & WATER
APR 11 2008
DIRECTOR'S OFFICE
ANCHORAGE

Drilling method: ☒ Air rotary, ☐ Cable tool ☐ Other _____
Well use: ☐ Public supply, ☐ Domestic, ☐ Other _____

Depth of hole: 110 ft, Casing stickup: 2 ft
Casing type: Steel Thickness 1/2 inches
Casing diameter: 6 inches Casing depth 17 ft
Liner type: PVC Diameter: 4.5 inches Depth: 110 ft
Note: .....

Static water (from top of casing): 35 ft on 4/5/08
Pumping level & yield: — feet after 1 hours at 6 gpm
Recovery rate: 6 gpm, Method of testing: low pressair
Development method: low pressair Duration: 1 hr

Well intake opening type: ☐ Open end ☐ Open hole, Other ☐
☐ Screened; Start: _____ ft, Stopped _____ ft
Screen type: _____ Slot/mesh size _____
☒ Perforated; Start: 100 ft, Stopped 110 ft
Start: _____ ft, Stopped _____ ft
Gravel packed ☐ Yes ☐ No From _____ ft to _____ ft
Note: .....

Grout type: bentonite Volume 60 lbs
Depth; from 0 ft, to 18 ft

Pump intake depth: _____ ft
Pump size _____ hp Brand name _____

Was well disinfected upon completion? ☐ Yes ☒ No
Method of disinfection: .....

Driller comments/ disclaimers: .....

Well driller name: VANDEHEY WELL DRILLING
Company name: .....
Mailing address: 57179 East End Rd.
City: Homer State: AK Zip 99603
Phone number : (907-235-8821
Drillers signature:
Date: ____/____/____

Alaska state law requires that a copy of this well log be forwarded to the Department of Natural Resources within 45 days (AK statutes 38.05.020, 38.05.035, 41.08.020, 46.15.020 and AK regulations 11 AAC 93.140). Faxes are acceptable.

Alaska DNR, Division of Mining, Land and Water,
550 W 7th Avenue, Suite 1020
Anchorage, AK 99501-3562

Phone (907)269-8639 and fax (907)269-8947

If the well is within city limits, the City of Anchorage requires that a copy of this well log be forwarded to the city within 60 days and another copy of this log be forwarded to the owner of the property, on which the well is located, within 30 days.

City Permit Number: _____
Date of Issue: ____/____/____

Parcel Identification Number: _____-_____-_____

Is well located at approved permit location? Yes ☐ or No ☐

Alaska Department of Natural Resource
Well Log Tracking System (DNR WELTS).
2021.

32640

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
Alaska Hydrologic Survey

WATER WELL LOG Revised 08/18/2016

Drilling Started: ___/___/_____ Completed: 8 / 27 / 2006 Pump Install: ___/___/_____

City/Borough	Subdivision	Block	Lot	Property Owner Name & Address
Nikiski	CRESTVIEW ESTATES		L17	J PATTINSON ,

Well location: Latitude _____ **Longitude** _____
Meridian S Township 006S Range 013W Section 7 , NW 1/4 of NW 1/4 of NE 1/4 of SE 1/4

BOREHOLE DATA: (from ground surface)
Suggest T.**M. Hanna's hydrogeologic classification system***
https://my.ngwa.org/NC__Product?id=a185000000BYub3AAD

	Depth From	Depth To

Include description or sketch of well location (include road names, buildings, etc.):

North

Drilling method: ☐ Air rotary, ☐ Cable tool, ☒ Other Auger
Well use: ☐ Public supply, ☐ Domestic, ☐ Reinjection, ☐ Hydrofracking
☐ Commercial, ☒ Observation/Monitoring, ☐ Test/Exploratory, ☐ Cooling,
☐ Irrigation/Agriculture, ☐ Grounding, ☐ Recharge/Aquifer Storage,
☐ Heating, ☐ Geothermal Exploration, ☐ Other _____
Fluids used: _____

Depth of hole: 32 ft Casing stickup: _____ft
Casing type: _____ Casing thickness: _____ inches
Casing diameter: _____ inches Casing depth: 20 ft
Liner type: _____ Depth: _____ ft Diameter: _____inches
Note: CASE TO 20 FT

Well intake opening type: ☐ Open end, ☐ Open hole, ☐ Other _____
Screen type: _____, Screen mesh size: _____
Screen start: _____ ft, Screen stop:_____ ft, Perforated ☐ Yes ☒ No
Perforation description:_____ Perf from: _____ ft, Perf to: _____ft, Perf from: _____ ft, Perf to: _____ ft
Gravel packed ☒ Yes ☐ No Gravel start: _____ ft , Gravel stop:_____ ft
Note: _____

Static water (from top of casing): 15 ft on___/___/_____ Artesian well ☐
Pumping level & yield: _____ feet after _____ hours at 9 gpm
Method of testing:_____
Development method:_____ Duration: _____
Recovery rate: _____ gpm

Grout type: _____ Volume _____
Depth: From _____ft, To _____ft

Final pump intake depth: _____ ft Model: _____
Pump size: _____ hp Brand name: _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: _____
Was water quality tested? ☐ Yes ☐ No
Water quality parameters tested: _____

Well driller name: .....
Company name: VANDEHEY WELL DRILLING.....
Mailing address:.....
City: _____ State: AK Zip: _____
Phone number: (_____) _____- _____
Driller's signature: _____
Date: _____/_____/_____

AS 41.08.020(b)(4) and AAC 11 AAC 93.140(a) require that a copy of the well log be submitted to the Department of Natural Resources within **45 days of well completion**. Well logs may be submitted using the online well log reporting system available at:

https://dnr.alaska.gov/welts/

OR email electronic well logs to

dnr.water.reports@alaska.gov

Anchorage Municipal Code 15.55.060(I) and North Pole Ordinance 13.32.030(D) require that a copy of this well log be submitted to the Development Services Department/City within **30 days of well completion**.

City Permit Number: _____
Date of Issue: _____/___/_____

Parcel Identification Number: _____-_____-_____

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

Alaska Department of Natural Resource
Well Log Tracking System (DNR WELTS).
2021.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
WATER WELL LOG

Drilling Started: 08/27/06 Completed: 08/27/06

City/Borough:	Subdivision:	BLOCK	LOT	Property Owner Name & Address: Jay Pattinson
Homer KPB	Crestview Estates		17	260 Cozy Cove Homer, AK 99603

Meridian _____ Township _____ Range _____ Section _____, ____ 1/4 of ____ 1/4 of ____ 1/4 of ____ 1/4

BOREHOLE DATA: (from ground surface) **Depth**

Material: Type, Color & wetness	From	To
Top Soil	0	2
Tan Silt & Clay	2	16
Gray Clay & Silt	16	24
Coal	24	25
Sand Stone	25	32

Drilling method: ☐ Air rotary, ☒ Cable tool ☐ Other _____
Well use: ☐ Public supply, ☐ Domestic, ☐ Other _____

Depth of hole: 32 ft, Casing stickup: 3 ft
Casing type: Steel Thickness 1/4 inches
Casing diameter: 10 inches Casing depth 20 ft
Liner type: _____ Diameter: _____ inches Depth: _____ ft
Note: .....

Static water (from top of casing): 15 ft on 8/27/06
Pumping level & yield: 1 feet after 1 hours at 9 gpm
Recovery rate: 9 gpm, Method of testing: bail
Development method: _____ Duration: _____

Well intake opening type: ☐ Open end ☐ Open hole ☐ Other ☐
☐ Screened; Start: _____ ft, Stopped _____ ft
Screen type: _____ Slot/mesh size _____
☐ Perforated; Start: _____ ft, Stopped _____ ft
Start: _____ ft, Stopped _____ ft
Gravel packed ☐ Yes ☐ No From _____ ft to _____ ft
Note: .....

Grout type: Bentonite Volume 55 lbs
Depth; from 0 ft, to 20 ft

Pump intake depth: _____ ft
Pump size _____ hp Brand name _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: .....

Driller comments/ disclaimers: .....
.....
.....

DEPT. OF NATURAL RESOURCES
DIV. OF MINING, LAND & WATER
MAY - 2 2007
DIRECTOR'S OFFICE
ANCHORAGE

Well driller name: VANDENEY WELL DRILLING
Company name: .....
Mailing address: 57179 East End Rd
City: Homer, AK 99603 Zip _____
Phone number : ( ) 907-235-8821
Drillers signature: _____
Date: ____/____/____

Alaska state law requires that a copy of this well log be forwarded to the Department of Natural Resources within 45 days (AK statutes 38.05.020, 38.05.035, 41.08.020, 46.15.020 and AK regulations 11 AAC 93.140). Faxes are acceptable.

Alaska DNR, Division of Mining, Land and Water,
550 W 7th Avenue, Suite 1020
Anchorage, AK 99501-3562

Phone (907)269-8639 and fax (907)269-8947

If the well is within city limits, the City of Anchorage requires that a copy of this well log be forwarded to the city within 60 days and another copy of this log be forwarded to the owner of the property, on which the well is located, within 30 days.

City Permit Number: _____
Date of Issue: ____/____/____

Parcel Identification Number: _____-_____-_____

Is well located at approved permit location? Yes ☐ or No ☐

ATTACHMENT D

USGS Seismic Design Map

Homer Raw Water Transmission Main

Latitude, Longitude: 59.66886216, -151.54337421

Date	2/22/2021, 1:46:00 PM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.601	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	0.781	Site-modified spectral acceleration value
S_{DS}	1	Numeric seismic design value at 0.2 second SA
S_{D1}	0.521	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.3	Site amplification factor at 1.0 second
PGA	0.6	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	16	Long-period transition period in seconds
SsRT	1.69	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.488	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.795	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.742	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.601	Factored deterministic acceleration value. (1.0 second)
PGAd	0.6	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	1.136	Mapped value of the risk coefficient at short periods
C_{R1}	1.071	Mapped value of the risk coefficient at a period of 1 s

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June 23, 2023

Evonne Reese
Environmental Program Specialist
Contaminated Sites Program, Spill Prevention and Response Division
Alaska Department of Environmental Conservation
Evonne.reese@alaska.gov
907.465.5229

Subject: Bridge Creek Pump Station Test Pit Work Plan

Site name: City of Homer – Bridge Cr Pump Sta.
ADEC file number: 2314.38.014
Hazard identification number: 2067

Dear Ms. Reese,

Antheia Environmental has prepared this work plan to conduct soil test pit sampling at the Bridge Creek Pump Station, in Homer, Alaska.

The following pages contain content required by the ADEC, as outlined in Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites (2017).

This workplan was prepared by Casey Greenstein, of Antheia Environmental, who meets the ADEC requirements of a qualified environmental professional.

June 23, 2023

Casey Greenstein
Principal and Environmental Scientist
Antheia Environmental

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Contents

Acronyms and abbreviations

AAC - Alaska Administrative Code
ADEC - Alaska Department of Environmental Conservation
bgs - below ground surface
BTEX – benzene, toluene, ethylbezene, xylenes
DRO – diesel range organics
GRO – gasoline range organics
mg/kg – milligrams per kilogram
PID – photoionization detector
TP – test pit

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Introduction

The City of Homer seeks to replace a water supply line connecting Bridge Creek Reservoir Pump Station with the City's water treatment facility. The Pump Station is an Alaska Department of Environmental Conservation (ADEC) listed contaminated site that was closed with institutional controls in 2006. This Work Plan is submitted to ADEC to obtain permission to begin excavation at the Pump Station and assess any remaining soil contamination, in order to plan for the water supply line replacement.

The 2006 ADEC decision for conditional site closure states that no further cleanup was required, even though soil contamination may still exist above most stringent cleanup levels. The nature and extent no longer posed an unacceptable risk to human health or the environment. The decision was contingent on site-specific conditions being met:

1. No soil disturbance or excavation of more than two feet bgs [below ground surface] in the area around the pump station, without prior approval from ADEC. ADEC will require that a qualified third-party environmental consultant be present at the time of excavation to ensure proper contaminated soil assessment, management, storage and disposal practices are followed.
2. City must obtain ADEC approval before moving or disposing of contaminated soil.
3. City must notify holders of any existing or future utility easements, permits, or ROWs [right-of-ways] across the property of the potential contamination and ADEC restrictions
4. City must notify ADEC of any action to change use or sale of the property
5. City must provide ADEC written report of site status. Report should address compliance with the above four conditions. At least every five years or when there are changes in the property use.

A 2016 reminder sent from ADEC to the City of Homer added an additional item:

6. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

At present, the City is intending to replace the water pipe connecting the Pump Station with the water treatment facility. This will result in a violation of point (1), above. This Work Plan is intended to address ADEC requirements so that soil excavation can take place.

Project objectives

- Dig test pits to a depth of water pipe burial, approximately 7 feet bgs
- Collect representative samples from each test pit in accordance with ADEC Field Sampling Guidance
- Screen soil samples, and as needed, dig additional step-out test pits
- Submit samples to an ADEC-approved lab for analysis of diesel range organics (DRO); gasoline range organics (GRO); and benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Delineate any remaining contaminants of concern in soils
- The results of this project will inform development of a Soil and Water Management Plan that will be implemented during water pipe replacement

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Project timetable/schedule
Digging and sampling test pits is expected to take one day, and work will commence shortly after ADEC approval of this work plan.

Qualified environmental professional/sampler
One qualified environmental professional/sampler will be onsite, Casey Greenstein, of Antheia Environmental.

Site description and background

The following map shows the Pump Station, access road, water line, property lines and proposed test pits.

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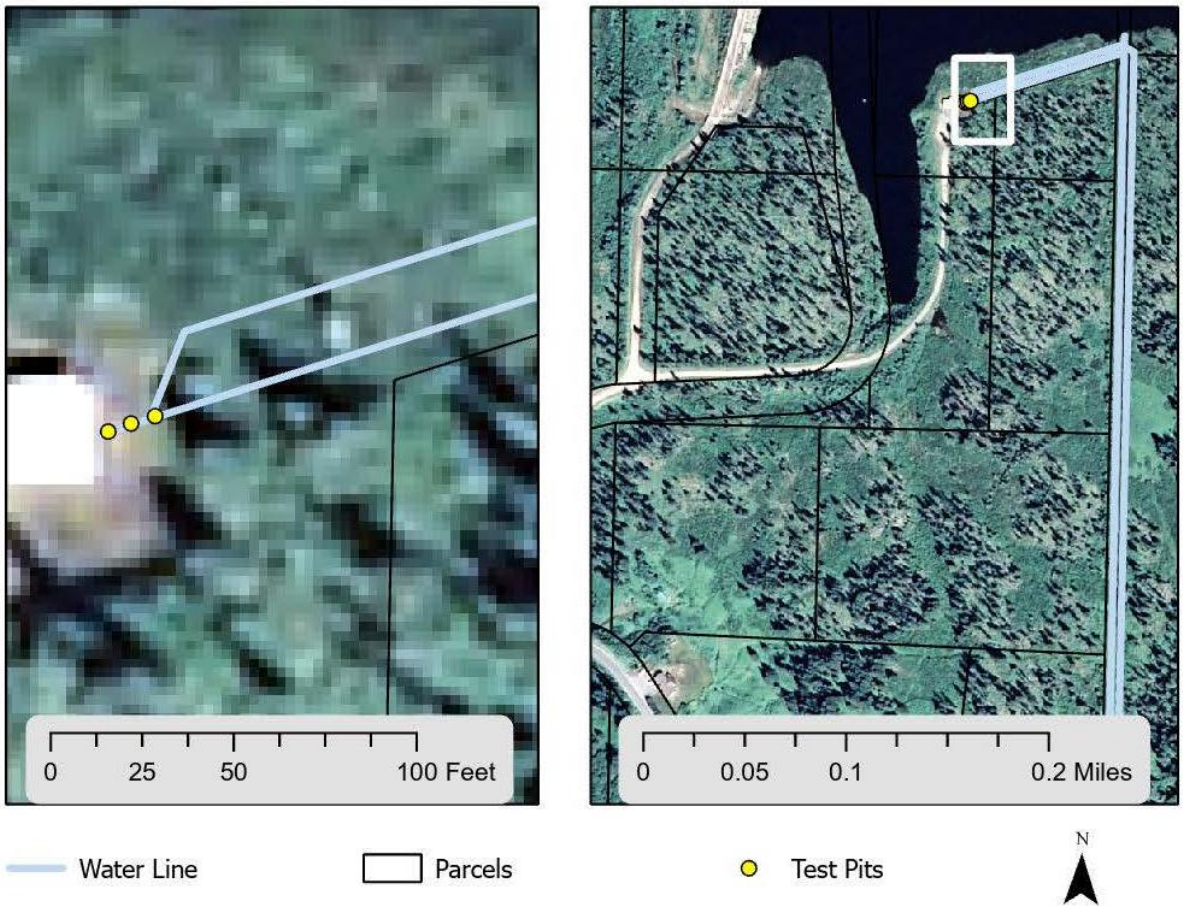
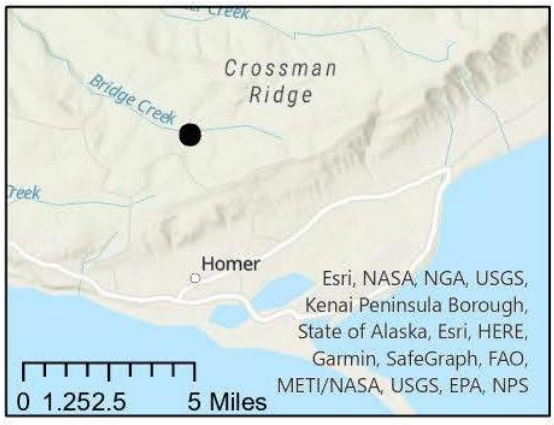
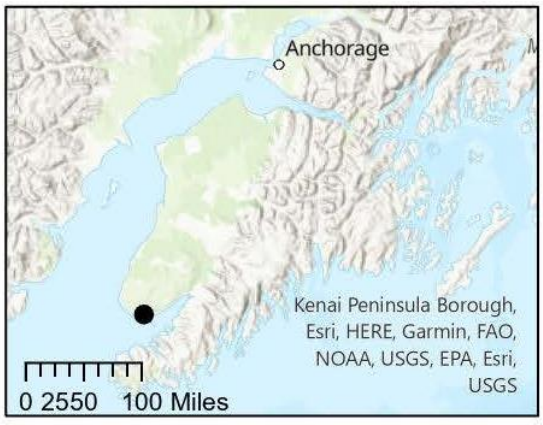
Bridge Creek Reservoir Pump Station and Water Line, Homer, Alaska



Overview Map - Homer



Overview Map - Kenai Peninsula



Bridge Creek Pump Station Test Pit Work Plan, 2023. ADEC File number 2314.38.014
NAD 1983 StatePlane Alaska 4 FIPS 5004 (US Feet)
Created by Antheia Environmental on behalf of the City of Homer

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Legal description/plat number: Section 7, T6S, R13W, S.M. Diamond Ridge Estates Subdivision Lot 1, Portion Thereof

Notes from landowner/responsible party
See Appendix A for additional notes regarding site description and background. See Lambe Engineers, 1994, for the initial assessment report.

Description of prior land use
See Appendix A for additional notes regarding site description and background. See Lambe Engineers, 1994, for the initial assessment report.

Institutional control in place: There is a locked gate and "no trespassing" sign where the road to the site branches off from the public use road. The pump house itself also has a locked fence around it.

Evidence of leaks or stained soils
There are no apparent leaks or stained soils currently.

Known or suspected releases, spills, disposal areas, and contaminant sources
There was a release of approximately 80 gallons of diesel fuel from underground fuel lines, which occurred between May 1993 and July 1994. Initial findings and cleanup recommendations are described in Lambe Engineers, 1994, *Contamination Assessment Report: Homer raw water Pump Station fuel release.*

Brief summary of past field efforts
Initial cleanup efforts focused on recovery of fuel and delineating the extent of contamination. Approximately 35 gallons were recovered from a perched water table in the imported gravel fill under the pump station area. Over 20,000 gallons of contaminated water was removed and treated.

In 1994 no excavation/removal happened because the spill occurred beneath the pump station. Groundwater was air sparged to the point of meeting groundwater cleanup criteria, and may have enhanced biodegradation of petroleum contaminated soil. However, no confirmation soil samples were collected after water met criteria.

The City conducted air sparging treatment of groundwater from 1996 to October 1997, and was ceased when groundwater cleanup levels were achieved in all monitoring wells. Groundwater sampling in June 1998 indicated all wells met cleanup levels.

A 2006 sampling event indicates groundwater contamination was still below cleanup levels.

Contaminants of potential concern

Contaminants of potential concern are provided below in Table 1. Proposed cleanup levels for soils are from 18 AAC 75.341, Method 2, Table B1 and B2. Migration to groundwater cleanup levels are proposed for this project, as they are more stringent than *under 40 inch zone* criteria. Units are milligrams per kilogram (mg/kg).

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Table 1. Tabular list of contaminants of concern and proposed cleanup levels for soils.

Contaminant	Proposed cleanup levels (mg/kg)
DRO	250
GRO	300
Benzene	0.022
Toluene	6.7
Ethylbenzene	0.13
Xylenes	1.5

Analysis to be performed
The following analyses of soil samples will be performed:

- GRO, analytical method AK101
- DRO, analytical method AK102
- BTEX, analytical method 8021B or 8260D

Preliminary conceptual site model

Pathways were identified in the 2006 document submitted to ADEC by the former Home Public Works Director, and are provided in Appendix A. To summarize:

- Indoor inhalation is potentially complete but not a risk due to low volatility of DRO.
- Outdoor inhalation is not a risk because the site previously met cleanup levels for ingestion/inhalation.
- Ingestion of soil is not a risk because the site previously met cleanup levels for ingestion/inhalation.
- Dermal contact with soil is not a risk because the site previously met cleanup levels for ingestion/inhalation.
- Ingestion of groundwater pathway is incomplete because groundwater meets cleanup criteria and is not utilized for drinking water.
- Ingestion of surface water pathway is incomplete because it has not been impacted.
- Migration to groundwater is complete, however contaminants are below cleanup levels.
- Migration to surface water is incomplete because there are no observed impacts to surface water.
- Migration to indoor air is potentially complete, but does not pose an unacceptable risk due to low concentrations and low volatility of DRO.

Excavation of soils from below the Pump Station building could cause a complete exposure pathway; as such, a condition of the ADEC Decision Document is that ADEC approval be obtained before any excavation activities take place at the pump station.

Due to institutional control, the only potential receptors are site workers.

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Sampling plan

Description of problem to be studied
The site was closed in 2006 with institutional controls and the requirement that soils not be disturbed. However, the City now plans to disturb soils in the course of replacing a water pipe. In accordance with ADEC stipulations, an approved Work Plan is required to disturb soils.

The levels of contamination – if any – in soils remaining at the project site is unknown. This project will conduct soil screening and soil sampling to determine if any contaminated soil remains onsite which needs to be moved offsite during future construction activities. Additionally, the current project will inform a future Soil and Water Management Plan, which will be implemented during water pipe replacement.

Actions and decisions that may result
It is possible that some portion of excavated soils will contain DRO, GRO, and/or BTEX exceeding cleanup criteria.

However, if no exceedances are detected, soils will remain onsite and will be used to backfill test pit excavations. This will also indicate that soils excavated during water pipe replacement are clean and can be used to backfill.

Where soils exceed cleanup criteria, they will be moved offsite. This will also indicate that soils excavated during water pipe replacement are contaminated and need to be moved offsite.

It is expected that the three initial test pits, and any additional step-out test pits, will clearly delineate the extent of contaminated soils. This will help inform where water pipe replacement excavated soils can be used as backfill and where the soil will need to be moved offsite.

Contaminated and clean excavated soils will be stockpiled in separate locations based on field screening results.

Data quality objectives
The data quality objective for this project is to gather sufficient quantity and quality of analytical data to meet project objectives described in this Work Plan. This consists of data with acceptable levels of accuracy, precision, representativeness, comparability, and completeness.

Narrative of sample locations and rational
Tests pits will be dug from near the building footprint, extending east along the proposed path of waterline excavation. The past fuel spill occurred at the building footprint, so if any contamination remains, that is likely where it will be detected. Two additional test pits will be dug at intervals moving away from the Pump Station.

Scaled site diagram with proposed sampling locations (legend and north arrow)
See figure provided in Site Description section of this document.

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Options/decision process for additional step-out sampling
Additional step-out test pits will be dug if there is obvious contamination remaining in soil, as indicated by field screening, olfactory, and/or visual observation. Step-outs will occur along the proposed water line excavation path until soils are determined to be free of contamination.

Description of review/approval process for any modifications/deviations to the approved plan
No modifications or deviations to the work plan are expected. Any changes will be documented and a description of the rationale for deviation will be provided to ADEC.

Deviations from Field Sampling Guidance
No deviations from ADEC's Field Sampling Guidance are expected.

Survey methods for documenting sampling locations, groundwater elevation, site features
There are existing spatial records of site features, and groundwater elevations have been measured regularly at the site's monitoring wells. Test pits dug during this investigation will be recorded with handheld GPS and/or swing ties measured from building corners.

Field Screening

Field screening will be used to determine where to collect samples for laboratory analysis, segregate excavated soils, and estimate the extent of contamination. Three test pits will be dug to a depth of approximately seven feet. Screening samples will be collected from each excavator bucketload or at approximately two-foot intervals from two feet bgs to the bottom of the excavation at approximately seven feet bgs. At the location with highest screening value, a soil sample will be collected for lab analysis. If there is no screening response, a sample will be collected at the base of the excavation. If groundwater is reached shallower than seven feet, a sample will be collected at the groundwater interface.

A photoionization detector (PID) and the heated headspace method will be used. All screening samples will be collected and measured in accordance with the heated headspace field screening procedure detailed in ADEC's *Field Sampling Guidance* (page 15). All readings will be recorded in a field notebook.

If readings indicate likelihood of soil contamination over ADEC cleanup levels, as indicated by PID readings over 200 parts per million, step-out test pits will be dug and screened until PID readings are less than 200 parts per million. The distance and direction of step-out test pits will be determined based on site conditions and professional judgement.

Samples will be identified with their test pit (TP) location number and depth of screening sample in feet. For example, TP1-2.5 to indicate test pit number 1, sample collected at 2.5 feet below ground surface.

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Sample collection methods

Sample parameters, analytical methods, container types, and hold times are provided in Table 2 (from ADEC *Field Sampling Guidance*). All samples will be shipped to SGS Anchorage immediately after collection, to arrive within the 14-day hold time.

Table 2. Sample analytes, methods, container types, and hold times.

Parameter	Analytical Method	Container Description	Preservation/ Holding Time
GRO	AK101	4 oz. amber glass	Methanol preservative, 0° to 6°C / 28 days
DRO	AK102	4 oz. amber glass	0° to 6°C / 14 days to extraction, 40 days to analysis of extract
BTEX	8021B or 8260D	4 oz. amber glass	Methanol preservative, 0° to 6°C / 14 days

Field Quality Control Measures

The following quality control samples will be collected:

- One duplicate field sample for every 10 samples collected for laboratory analysis
- One trip blank per cooler containing samples for volatiles analysis
- One temperature blank per cooler

All samples will be shipped by the United State Post Office to SGS in Anchorage, Alaska, and will include a properly filled out Chain of Custody form. They will be shipped with frozen gel packs.

Samples will be identified using the format detailed in Table 3.

Table 3. Laboratory sample identification scheme

Digits	Description	Code Examples
1-2	Year	23
3-5	Project code	CoH
6-8	Location type	TP
	Field duplicate	FD
9-10	Sequential number	01

Example: 23-CoH-TP-01 (2023 City of Homer Test Pit 1)

The relative percent differences tolerances for duplicate samples are less than 50% for soil media (ADEC 2019).

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Investigation derived waste management

As test pits are excavated and screened, the removed soils will be segregated based on field observation and screening results. Soils deemed clean (no PID response, odor, or visible sheen) will be stockpiled directly on the ground. Soils judged to be potentially contaminated will be stockpiled on – and covered with – 6 mil HDPE plastic sheeting or placed directly into Super Sacks. These will remain onsite until laboratory results are obtained and confirm whether stockpiled soils exceed cleanup criteria.

The City currently has a remediation site at the City of Homer Sewer Plant for contaminated soil. Contaminated soil from the Pump Station may be moved to the Sewer Plant location. Otherwise, contaminated soil will be moved to the Kenai Peninsula Borough Central Landfill in Soldotna.

Field documentation

All field activities will be recorded in a dedicated field notebook. Documentation will include:

- Date
- Weather and other salient observations
- Sampling team members
- Field measurements
- Documentation of instrument calibration
- Location of activity and site conditions
- Field observations and comments
- Changes to sampling protocol or work plan deviations, if applicable
- Site sketches
- Survey and location of sampling points

Additional data to be collected includes GPS coordinates of test pits and site photographs.

Analytical methods

All laboratory samples will be shipped to SGS Anchorage for analysis. The requested analyses, turnaround times, container type and preservation type are provided above in Table 2.

Sample volumes will be collected in accordance with lab specifications. The lab limit of detection and quantitation will be less than the project proposed cleanup levels.

References

Alaska Department of Environmental Conservation (ADEC). 2022. Field Sampling Guidance. Division of Spill Prevention and Response, Contaminated Site Program.

Alaska Department of Environmental Conservation (ADEC). 2017. Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites. Division of Spill Prevention and Response, Contaminated Site Program.

Lambe Engineers. 1994. Contamination Assessment Report: Homer Raw Water Pump Station Fuel Release. Prepared for the City of Homer by Lambe Engineers, a division of DOWL, Inc., Soldotna, Alaska. November, revised December 1994.

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Appendix A – Historical documentation of site activities

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

43335 k-Beach Road, Suite 11
Soldotna, AK 99669
PHONE: (907) 262-5210
FAX: (907) 262-2294
http://www.state.ak.us/dec/

File: 2314.38.014

August 28, 2006

Carey S. Meyer
Public Works Director
3575 Heath Street
Homer, Alaska 99603

Re: **Record of Decision** – Conditional Closure
City of Homer - Bridge Creek Pump Station
ADEC Reckey No. 1994230120701

Dear Mr. Meyer:

The Alaska Department of Environmental Conservation, Contaminated Sites Program (ADEC) recently reviewed our file related to the above referenced site.

Based on the information in our records, ADEC has determined that no further cleanup action is required at this time. Although soil contamination may still exist at the site above the most stringent 18 AAC 75 cleanup levels, the nature and extent of this contamination no longer poses an unacceptable risk to human health or the environment. Because of the potential for residual soil contamination, please note that this determination is contingent upon site-specific conditions presented in this ADEC Decision document.

This letter summarizes the regulatory issues associated with this facility and the decision process used to determine the environmental status of this site.

Introduction

Site name and location:
City of Homer-Bridge Creek Pump Station
Homer, Alaska

Regulatory authority under which the site is being cleaned up:
This project was reviewed under the applicable regulatory authority in 18 AAC 75

Name and mailing address of current contact and/or responsible person:
Carey S. Meyer
Public Works Director
3575 Heath Street
Homer, Alaska 99603

Legal Description:
Section 7, T6S, R13W, S.M. Diamond Ridge Estates Subdivision Lot 1, Portion Thereof

Land Owner:
City of Homer

Background
The site remains an active drinking water pump station for the City of Homer. A release of approximately 80 gallons of diesel fuel occurred from underground fuel lines between May 1993 and July 1994. Cleanup efforts initially undertaken at that time concentrated on the recovery of fuel product and identifying the extent of the contamination due to the close proximity to the Bridge Creek Reservoir. Approximately 35 gallons of diesel fuel was recovered from a perched water table in the imported gravel fill beneath the pump station area. In addition, in excess of 20,000 gallons of petroleum contaminated water was removed and treated by the City.

The City of Homer began air sparging treatment of the groundwater in 1996 and continued air sparging activities until October 1997. Air sparging treatment was discontinued after groundwater cleanup levels were attained in all monitor wells. A subsequent groundwater sampling event occurred in June 1998 and all wells sampled met cleanup levels. The highest diesel range organics (DRO) concentration encountered was 0.83 mg/L, the highest gasoline range organics (GRO) concentration was 21.2 ug/L, the highest benzene concentration was 1.05 ug/L, and the highest Xylenes concentration encountered was 1.55 ug/L. Groundwater samples collected in 2006 also depicts that groundwater contamination is below regulatory cleanup levels. GRO and BTEX were not detected in the two monitor wells sampled, while DRO was encountered in one monitor well at a concentration of 0.503 mg/L.

Contaminants of Concern
Contaminants of concern at the site include the following petroleum hydrocarbon compounds:

- Diesel range organics (DRO)
- Gasoline range organics (GRO)
- Benzene, toluene, ethylbenzene and xylenes (BTEX)

Soil Contamination
In 1994, DRO were detected in the soil at levels as high as 1,940 mg/kg. GRO were encountered in the soil at concentrations up to 667 mg/kg. Benzene was encountered in the soil at concentrations up to 0.28 mg/kg, and BTEX was encountered in the soil at concentrations up to 133.8 mg/kg. No excavation and removal of contaminated soil occurred because the contaminated soil was beneath the pump station facility. In addition, no confirmation soil sampling occurred after it was demonstrated that the groundwater met the groundwater cleanup levels. Although air sparging treatment of the groundwater aquifer may have enhanced the biodegradation of petroleum contaminated soil, it is unknown whether or not soil contamination still exists at this site above regulatory cleanup levels.

Groundwater Contamination
The groundwater aquifer at this site was encountered at approximately 5 feet below ground surface. Groundwater monitoring initially detected DRO, GRO, and benzene impacts to groundwater quality above the 18 AAC 75 groundwater cleanup levels. DRO were detected in

the groundwater at levels as high as 2.6 mg/L, GRO were detected in the groundwater at concentrations up to 2.71 mg/L, and benzene was detected in the groundwater at concentrations up to 0.498 mg/L. Total BTEX was detected in the groundwater at concentrations up to 1.929 mg/L. Groundwater contaminant concentrations have since decreased and are now below the 18 AAC 75 groundwater cleanup levels.

Pathways Identified
Human health exposure pathways and contaminant migration pathways were evaluated in this decision document.

The exposure pathways for human health that were evaluated include: indoor and outdoor inhalation; ingestion of soil; dermal contact with soil; and the ingestion of groundwater or surface water.

The indoor air exposure pathway is potentially complete but is not believed to pose an unacceptable risk due to the low vapor pressure (volatility) of DRO. The release occurred more than 10 years ago, and fuel vapors within the building have never been identified as an issue, even when contaminant concentrations were much higher.

The exposure pathways of soil ingestion, dermal contact, and outdoor inhalation do not pose an unacceptable human health risk because the soil samples collected from outside of the building footprint all met the soil cleanup levels for ingestion/inhalation. The excavation of soils from beneath the building foundation could potentially complete these exposure pathways. In order to prevent unacceptable risks to human health, a condition of this ADEC decision requires that ADEC approval be obtained prior to any excavation activities in the immediate vicinity of the pump station.

The groundwater ingestion exposure pathway is not complete because groundwater now meets the groundwater cleanup levels and groundwater is not utilized as a source of drinking water at this site. The surface water ingestion exposure pathway is incomplete because surface water has not been impacted.

The contaminant migration pathways that were evaluated include: migration to groundwater; surface water, and indoor air.

The migration to groundwater pathway is considered complete since DRO, GRO, and BTEX contamination were detected in groundwater, however the contamination no longer exceeds the groundwater cleanup level.

There are no known impacts to surface water; therefore the migration to surface water pathway is incomplete. Although this site is immediately adjacent to the Bridge Creek Reservoir, response actions undertaken by the City of Homer prevented the migration of contamination into this surface water.

The migration to indoor air pathway is potentially complete but should not pose an unacceptable risk due to the relatively low DRO concentrations in proximity to the pump station building and the low vapor pressure (volatility) of DRO.

Cleanup Levels

The soil cleanup levels established for this site are the 18 AAC 75.341 Method 2, Table B1 and B2 'migration to groundwater' cleanup levels (Under 40 inch zone). The migration to groundwater pathway is the most stringent soil cleanup level and allows unrestricted closure if the levels are achieved.

The groundwater cleanup levels established for this site are the 18 AAC 75.345, Table C levels.

The following table provides the soil and groundwater cleanup levels for this site:

Table 1: Cleanup Levels for City of Homer-Bridge Creek Pump Station

Contaminant	Soil Cleanup Level (mg/kg)	Groundwater Cleanup Level (mg/L)
Benzene	**0.02**	0.005
Ethylbenzene	5.5	0.7
Toluene	5.4	1.0
Xylenes (total)	78	10.0
GRO	**300**	1.3
DRO	**250**	1.5
RRO	10,000	1.1

Bolded cleanup level indicates contamination potentially remains exceeding cleanup value.

ADEC Decision

Based on the available information, ADEC has determined that the cleanup actions employed at the City of Homer Bridge Creek Pump Station were effective in removing the majority of spilled diesel fuel. Residual soil contamination likely remains at the site above the most stringent 18 AAC 75.341 soil cleanup levels but with appropriate controls and restrictions, this contamination should no longer pose an unacceptable risk to human health or the environment.

ADEC has determined that no further remedial action is required at this time subject to the following conditions:

1. The City shall not excavate or otherwise disturb soil to a depth of greater than two feet below the ground surface in the area immediately surrounding the pump station, or from beneath the pump station should the facility be removed, without the prior approval of ADEC. ADEC will require that a qualified third party environmental consultant be present at the time of excavation to ensure proper contaminated soil assessment, management, storage, and disposal practices are followed;

2. In accordance with 18 AAC 75.325(i) and 18 AAC 75.370(b), the City shall obtain ADEC approval before moving or disposing of contaminated soil;

3. The City shall notify holders of any existing or future utility easements, permits, or rights-of-way across the property of the potential to encounter soil contamination, and of

the applicable ADEC restrictions on contaminated soil excavation, transport, and disposal.

4. The City shall notify ADEC of any action that is undertaken to cause a change in use or sale of the property. Prior to a change in use or sale of the property, the City may be required to evaluative human health or environmental risks associated with any residual contamination to determine that the property is suitable for the proposed use.

5. The City must provide ADEC with a written report on the property use status every 5 years. This report should also briefly address compliance/non-compliance with the above 4 conditions.

In accordance with 18 AAC 75.380(d)(2), ADEC may require additional assessment and/or cleanup action if future information leads to a revised determination that this site poses an unacceptable risk to human health or the environment.

An institutional control will be established on the ADEC database to document residual soil contamination remaining on site above the most stringent 18 AAC 75.341 soil cleanup levels. Site closure (without conditions) could be achieved should soil sampling confirm that all soil meets the 18 AAC 75.341 'migration to groundwater' cleanup levels for DRO, GRO, and benzene.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 -18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

If you have questions about this decision, or any of the attached conditions, please contact me at (907) 262-5210, extension #245.

Sincerely,

Don Fritz
Environmental Program Specialist

CC: Jim Hobbs- Water/Wastewater Superintendent

Carey's memo circa 2009

Archived - w/s - fuel spill

1. I'd be interested in what ADEC has to say, but I'm not convinced that adding additional monitoring wells is justified at this time.

   Like most of the Homer area, this site consists of a surficial layer of organics over fine-grained, silty, very impermeable subsoils. Soil borings taken prior to the construction of the pump station building show this organic layer uphill of the building to be one foot thick; near the lake to be three foot thick. No groundwater was encountered in early September (when these borings were completed). The gravel pad under the building is at least 5 foot thick. The well log for Well 5 indicates a pad thickness of over 10 feet. Logs from the other monitoring wells installed in the pad around the building indicate pad thickness to be 3.5 - 6.0 feet.

   When groundwater is present it is perched on the impermeable subsoils, in the organic surficial layer. Relatively deep monitoring wells were needed to adequately sample groundwater within the area immediately around the building, since the area had been excavated and backfilled with gravel to provide a stable foundation for the building. What groundwater does move through the site is collected into this porous backfill material. The two remaining monitoring wells that exist between the building and the reservoir should be adequate to sample groundwater within the building and pad excavation.

   To assist us in determining what should be done now that the contaminated soil has been removed, one approach would be to take a second sample from an existing monitoring well within the building pad to determine if groundwater continues to exceed clean-up levels. (My understanding is that a previous sample taken prior to contaminated soil removal measured 1.87 mg/l; 1.5 being the clean-up threshold level).

   If the second sample is below clean-up levels, no additional monitoring may be required (ADEC's call). If we are still concerned, it may be more prudent to pump and treat groundwater from the relatively thick porous gravel building pad before it has a chance to move into the thinner surficial organic soils between the building pad and the reservoir. If we conclude that monitoring groundwater movement toward the reservoir is necessary, there may be less expensive (and just as effective) methods of monitoring this water than boring deep monitoring wells; such as manually driving shallow well points into the thin organic mat between the building and the reservoir.

2. As discussed above, it may be advisable to purge water from the existing wells within the building pad, but I'm not sure how valuable purging water from any new wells in the thin organic layer between the building and the reservoir would be. I would also suggest that if we decide that additional groundwater monitoring needs to be accomplished, that it would be useful only from May thru November.

3. Public Works did construct a swale along the upper side of the building to divert surface water away from the building site. It is 3 feet deep were it begins directly uphill and south of the building and tapers to no depth where it daylights southeast of the building. Since the thin surficial organic layer uphill of the building site is exposed by a cut bank, this swale should effectively intercept any uphill surface water. Deeper swales or French drains (in my opinion) are not going to be more effective. In fact, deeper drainage improvements (such as a French drain) would have no usable outfall; the lake is not much lower than the existing daylighted swale outfall. Ground water in the area is perched in the thin surface organic layer, not in an

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

410 Willoughby Ave., Suite 303
P.O. Box 111800
Juneau, Alaska 99811-1800
Main: 907.465.5390
Fax: 907.465.5218
www.dec.alaska.gov

File: 2314.38.014

Certified Mail, Return Receipt Requested
Article No. 7014 2120 0001 4209 6304

February 25, 2016

City of Homer
Public Works Director
3575 Heath Street
Homer, AK 99603

Re: Institutional Controls verification for City of Homer - Bridge Creek Pump Station, located at 63117 Shelton Drive in Homer, Alaska 99603

The Contaminated Sites Program conducts periodic verification of closed sites where institutional controls (land use restrictions) are required under 18 AAC 75.375. We have identified City of Homer - Bridge Creek Pump Station as a site with institutional controls.

In order to prevent people from being exposed to any remaining contamination on the property, **this letter is being sent as a reminder** of the conditions placed on the property as part of the 2006 Record of Decision granted by the Alaska Department of Environmental Conservation (ADEC). At the time of closure, soil and groundwater contamination were documented as remaining on the property. The contamination is from a release of approximately 80 gallons of diesel fuel occurring from underground fuel lines between May 1993 and July 1994.

The 2006 determination is subject to the following site-specific conditions and/or controls:

1. The city shall not excavate or otherwise disturb soil to a depth of greater than two feet below ground surface in the area immediately surrounding the pump station, or from beneath the pump station should the facility be removed, without the prior approval of ADEC. ADEC will require that a qualified third party environmental consultant be present at the time of excavation to ensure proper contaminated soil assessment, management, storage, and disposal practices are followed.
2. In accordance with 18 AAC 75.325(i) and 18 AAC 75.370(b), the City shall obtain ADEC approval before moving or disposing of contaminated soil.
3. The City shall notify holders of any existing or future utility easements, permits, or rights-of-way across the property of the potential to encounter soil contamination, and of the applicable ADEC restrictions on contaminated soil excavation, transport, and disposal.

4. The City shall notify ADEC of any action that is undertaken to cause a change in use or sale of the property. Prior to a change in use or sale of the property, the City may be require to evaluate human health or environmental risks associated with any residual contamination to determine that the property is suitable for the proposed use.
5. The City is required to provide ADEC with a written report on the property use every 5 years, or earlier, if and when there are changes in the property use at this site.
6. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

In addition to the conditions above, you are required to notify the ADEC if there are any changes in land use or ownership. Failure to maintain these requirements may result in re-opening the site by the Contaminated Sites Program, in which case, further remediation could be mandatory.

In accordance with 18 AAC 75.380(d)(2), ADEC may require additional site assessment, monitoring, remediation, and/or necessary actions at this facility should new information become available that indicates contamination at this site may pose a threat to human health or the environment.

If you seek to have the institutional controls removed from this site, you can choose at any time to voluntarily conduct additional assessment, monitoring or further cleanup to demonstrate that contamination at the site now meets the applicable cleanup levels under 18 AAC 75.

This site information is a matter of public record and is available at ADEC's online database record at: http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/SiteReport/2067

If you have any questions regarding this site, please contact me at (907) 465-5229 or evonne.reese@alaska.gov and I will be glad to assist you.

Sincerely,

Kristin L. Brown

for Evonne Reese
Environmental Program Specialist
Institutional Control Unit

Encl: 2006 Record of Decision

You may submit any needed documentation electronically. If your submittal exceeds 8 megabytes, you may submit it to me through the Alaska ZendTo "drop-off" option at https://drop.state.ak.us/drop/. The Division of SPAR/Contaminated Sites Program prefers and encourages electronic submittals.

w/ Todd

10-21-21

TABLE B - CITY OF HOMER # 09-001
HYDROCARBON CONCENTRATIONS IN GROUNDWATER
BRIDGE CREEK PUMPHOUSE FACILITY, HOMER, ALASKA
MARCH 2009

HYDROCARBON CONCENTRATIONS IN GROUNDWATER								
WELL NUMBER SAMPLE ID	DATE SAMPLED	DEPTH TO WATER BELOW TOP OF WELL CASING (ft)	DIESEL RANGE ORGANICS (mg/L)	GASOLINE RANGE ORGANICS (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL-BENZENE (ug/L)	TOTAL XYLENES (ug/L)
W1	3/7/2009	7.15	ND	Not Analyzed	ND	0.860	ND	ND
W2	3/7/2009	7.5	ND	Not Analyzed	1.18	7.14	2.89	16.5
W3	3/7/2009	7.9	1.21	Not Analyzed	2.23	19.3	15.8	102
W4	3/7/2009	8.3	ND	69.9	ND	1.98	1.48	8.38
W5	3/7/2009	7.3	1.31	185	ND	1.22	6.29	7.47
RW6	3/8/2009	5.15	1.87	Not Analyzed	ND	1.03	0.950	6.42
ADEC Groundwater Cleanup Levels Per 18 AAC 75 345, Table C			1.5	1300	5	1000	700	10,000

NOTES:
1) Diesel Range Organics (DRO) by Method AK 102 .
2) Gasoline Range Organics (GRO) by EPA Method 8260B.
3) Aromatic volatiles (BTEX) by EPA Method 8260B. Total xylenes refers to the summation of p&m-xylene and o-xylene concentrations.
4) ND indicates the analyte was undetected at the detection limits noted in the laboratory analytical report.
5) Not Analyzed indicates the constituent was not analyzed for in this sample.
6) Highlighted values indicate detected concentrations are above ADEC Groundwater Cleanup Levels.

2 oil Spills

1996 Spill - closed out

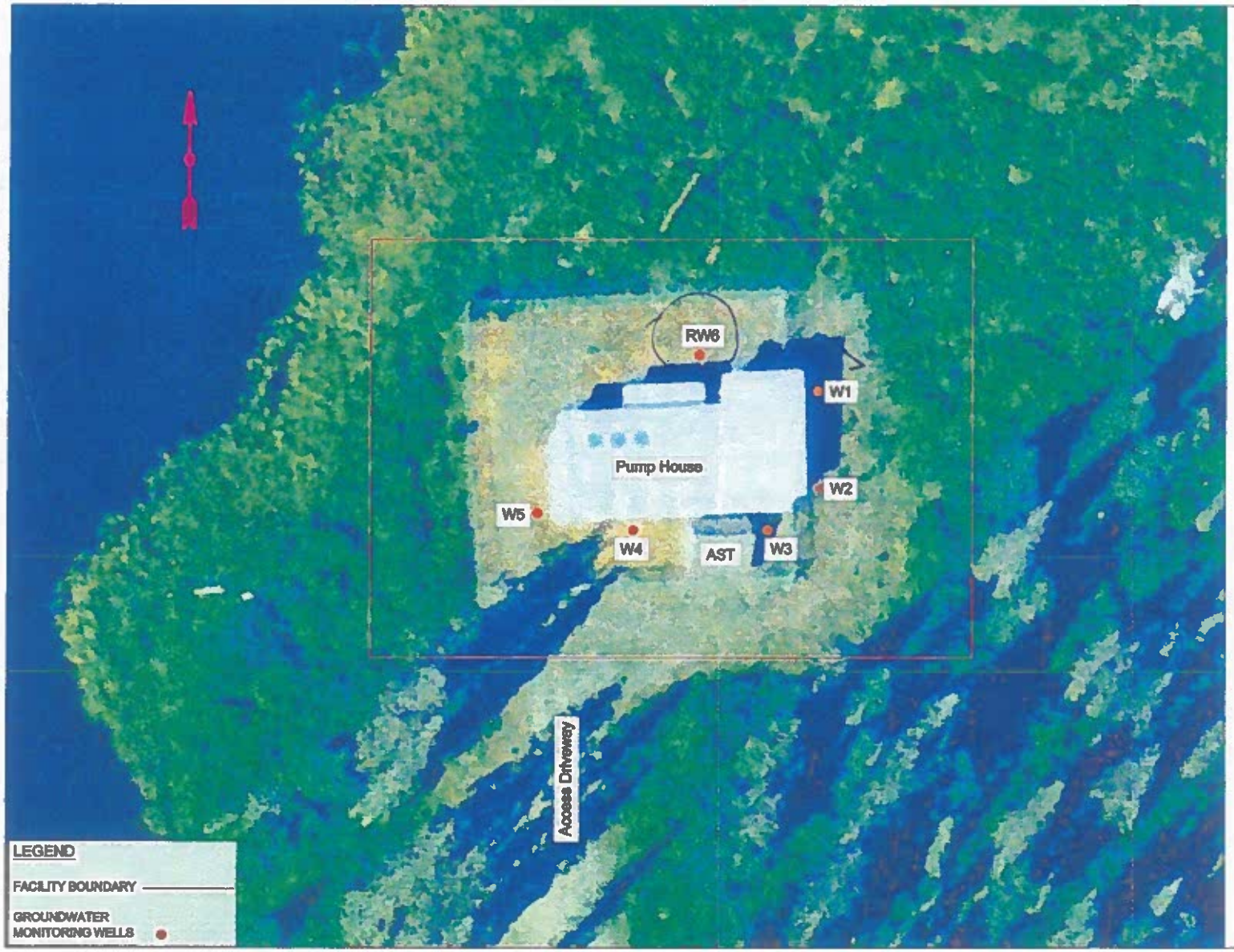
2009 Spill

Action Plan

① Todd's crew will get back to the testing program identified in the letter ② plus they'll pump the test wells & run it through the oil/water seperator ③ Contact ADEC & ascertain what needs to be done & close the project out.

④ Look up last test results

10-21-21



NORTHERN TRAILS CONSULTING CAD SERVICES

TELLUS, Ltd.
Geological Services

City of Homer
Bridge Creek Pump House Facility
Homer, Alaska

#09-001	Site Diagram
Photo Date(s):6/8/09	
Photo Scale: 1"=20' Viewport Scale: 1=1	Figure 1

Antheia Environmental
178 Skyline Dr | Homer, AK 99603
casey@antheiaenvironmental.com
www.antheiaenvironmental.com
907.299.5678

Appendix B – Resume of Qualified Environmental Professional

Resume for Casey Greenstein, Antheia Environmental

EDUCATION

MS, Environmental Management
University of San Francisco, 2011

BA, Liberal Studies with concentrations in environmental studies and biology
Green Mountain College, 2006

REGISTRATIONS, CERTIFICATIONS, LICENSES, AND TRAINING

- Alaska Department of Environmental Conservation Qualified Environmental Professional
- Alaska Department of Environmental Conservation Licensed Pesticide Applicator
- 40-Hour Princeton Groundwater Pollution and Hydrology Course
- 40-Hour Hazardous Waste Operation and Emergency Response (HAZWOPER)
- 8-Hour HAZWOPER Annual Refresher
- 20-Hour 49CFR/ICAO/IATA Hazardous Materials Transportation
- Alaska Master Gardener
- 38-Hour USACE Wetland Delineation Training
- CPR/AED/First Aid Training - Wilderness First Aid - Bear Awareness and Defense

WORK HISTORY

Environmental Scientist / Sole Proprietor
Antheia Environmental, 2019–Present
Natural Resource Specialist
Homer Soil and Water Conservation District, 2021–Present
Environmental Scientist
Ahtna Environmental, Inc., 2016–2018
Research Scientist
Alaska Center for Conservation Science, University of Alaska Anchorage, 2011–2016
Research Technician
California Wind Energy Association/Eco Stat, Inc., 2010-2011
Habitat Restoration Technician
Shelterbelt Builders, Inc. 2007-2009

EXPERIENCE SUMMARY

- 16 years of experience as an Environmental Scientist, including contaminated site remediation, soil and water sampling, research, conservation, restoration
- 5 years of field experience in Alaska, in contaminated sites
    - Contaminated site soil and water screening and sampling in accordance with Alaska Department of Environmental Conservation guidelines and other regulatory requirements
    - Site assessments and characterization
    - Laboratory data management and analysis, interpretation and reporting
    - Geospatial data management and analysis
    - Technical writing, including work plans, reports, soil and water management plans

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CONTAMINATED SITE FIELD WORK

Bureau of Land Management

Tanacross Airfield Groundwater Monitoring, Tanacross, Alaska, 6/2016-9/2016
Groundwater sampling of 21 wells with submersible pump. Included all preparations and logistics, data management, and reporting.

Federal Aviation Administration

Cleanup and Direction Finder Demolition, Woody Island, Alaska, 7/18-10/18
Field team lead. Removed over 800 cubic yards of contaminated soil and debris from historical landfill. Directed equipment operators and field crew in segregation of waste streams of PCBs, petroleum products, asbestos, burnt debris, lead, and uncontaminated surface soils. Segregated metal debris and lead-acid batteries for recycling and PCB-containing debris for disposal. Tracked over 200 one-cubic yard bags of debris/soil and labeled all hazardous materials indicated by laboratory results. Screened with photoionization detector (PID) and x-ray fluorescence (XRF), sampled each soil/debris bag, and sampled excavation footprint. Performed data management and waste tracking.

National Oceanic and Atmospheric Administration, National Weather Service (NOAA, NWS)

Environmental Sampling and Analysis Phase II Environmental Site Assessment, Former Barrow Weather Service Office & Housing Site, Barrow, Alaska, 6/2017-9/2017
Field screening with PID. Discrete and composite soil sampling. Toxicity characteristic leaching procedure sampling.

Remedial Action, Former Barrow Weather Service Office & Housing Site, Barrow, Alaska, 4/18
Soil removal, field screening with XRF and PetroFLAG, air monitoring with PID, and soil sampling. Working with equipment operators to excavate soils from former building footprints, and screening and sampling soils to confirm contaminant removal.

United States Coast Guard

US Coast Guard Base Kodiak Long-term Groundwater Monitoring, Kodiak, Alaska, 7/2016
Groundwater sampling of 21 wells with a bladder pump in accordance ADEC specification and Resource Conservation and Recovery Act (RCRA) permit. Included submission of quarterly monitoring reports.

United States Army Corps of Engineers

Formerly Used Defense Site (FUDS) and Military Munitions Response Program (MMRP) Site Inspection at Atka Air Force Auxiliary Field Open Burn/Open Detonation, Craters, and Rifle Range Munitions Response Site, Atka, Alaska, 7/2017
Field team lead. Surveys for unexploded ordinance and related soil contamination. Multi-incremental soil sampling. Site inspections to determine future eligibility for inclusion as a FUDS MMRP. Gather data to determine the presence or absence of munitions and explosives of concern, munitions constituents, and munitions debris. Work in collaboration with unexploded ordinance professionals. Data points and polygons recorded and mapped with Trimble GPS and ArcGIS. Included preparations, data management, and reporting.

Atka Phase II HTRW Remedial Investigation, Atka Air Force Auxiliary Field Formerly Used Defense Site, Atka, Alaska, 8/2016-6/2017
Developed and sampled 10 groundwater monitoring wells. Collected over 100 soil and surface water samples. Collaborated in report production.

Antheia Environmental
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casey@antheiaenvironmental.com
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907.299.5678

United States Air Force

Clear Air Force Station Invasive Plant Survey, Clear, Alaska, 8/2017
Field team lead. Developed project proposal, budget, and survey methods. Conducted non-native plant surveys across 40 acres. Data points recorded and mapped with Trimble GPS and ArcGIS. Included all preparation and logistics, data management, reporting, and management recommendations.

Various Non-governmental Organizations

Anchorage Fueling Service Company-Aircraft Service International Group
Anchorage International Airport, Anchorage, Alaska, 7/2016-5/2017
Decommissioned 5 groundwater wells. Installed and developed 5 new groundwater wells. Collected groundwater samples with bladder pump.

Port of Anchorage
Groundwater monitoring at the Port of Anchorage, Anchorage, Alaska, 7/2016
Collected groundwater samples with peristaltic pump.

DNA Environmental Consultants, LLC
Fall 2019 Removal Work at Lease Tract 27, Deadhorse, Alaska, 9/2019-10/2019
Delineated historical fuel spill. Screened and sampled test pits to establish contamination boundary. Removed and stockpiled clean overburden; screened and sampled stockpiles. Screened with PID using the heated headspace method. Data points recorded and mapped with Trimble GPS and ArcGIS. Included report writing and data management.

DNA Environmental Consultants, LLC
Nenana Middle Tank Farm 2019 Groundwater Sampling, Nenana, Alaska, 10/2019
Sampled 10 groundwater monitoring wells with submersible pump.

DNA Environmental Consultants, LLC
Nome East Harbor Site Background Research and Site Characterization 2020-2021
Reviewed all available historical documentation of environmental background and ownership Nome's East Harbor. Compiled past environmental sampling data, pipeline inspections, and dates of ownership to determine liability of contamination at the site. Conducted field work, including surface ISM sampling for lead, subsurface screening with OIP and sampling for hydrocarbons, and groundwater well installation and monitoring. Subsurface 3D contaminant modelling with Voxler.

DNA Environmental Consultants, LLC
Fort Yukon Additional Site Characterization Work Plan, Former Crowley Tank Farm
Replaced groundwater monitoring wells, and collected soil and water samples, to delineate fuel-contaminated soil and dissolved-phase petroleum hydrocarbon plume.