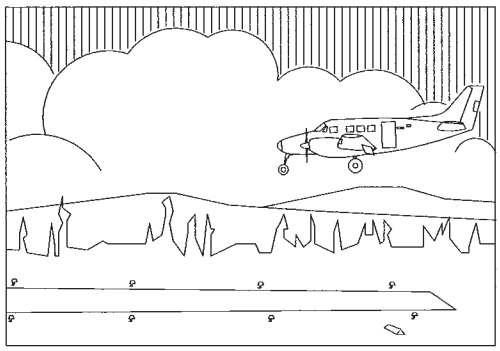
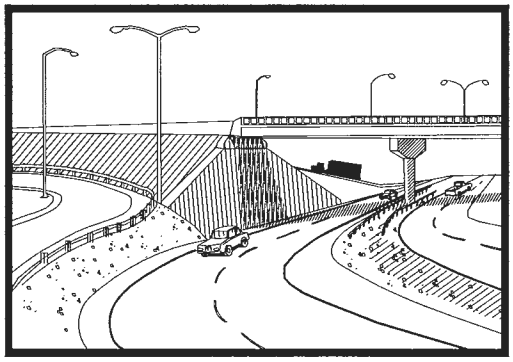
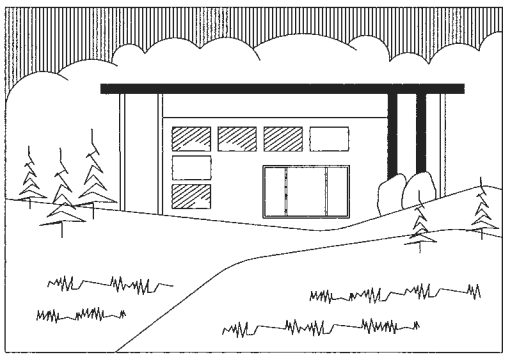
Material Site Investigation

Kotzebue to Cape Blossom Road

NCPD-0002(204) AKSAS: 76884

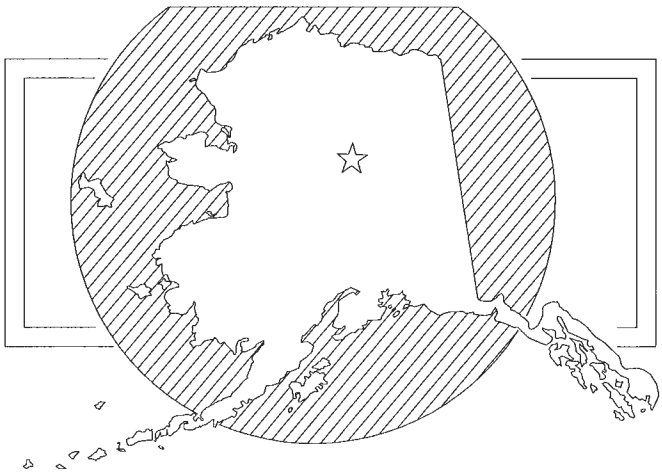






STATE OF ALASKA

Department of Transportation and Public Facilities



NORTHERN REGION

October 2011

MATERIAL SITE INVESTIGATION
Kotzebue to Cape Blossom Road
AKSAS: 76884
NORTHERN REGION
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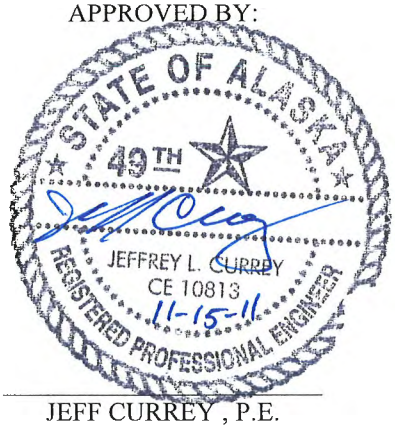


JEFF CURREY , P.E.
Materials Engineer

Contents

Figure 1. Material Site Locations

Summary

At the request of Ryan Anderson, Aviation Project Manager, the Northern Region Materials Section has been conducting exploration for a possible material site on the Baldwin Peninsula. This material is intended as a source of crushed aggregate and borrow for expansion of the Kotzebue Airport safety area and construction of a road from Kotzebue to Cape Blossom.

The general scarcity of coarse aggregate material on the Baldwin Peninsula, and the anticipated need for 500,000 cubic yards for airport and road work, prompted the undertaking of two material site investigations, one offshore near Cape Blossom and the other along the northeast costal bluffs referred to as Iggy Hill (figure 1).

From April 2009 through March of 2011, we conducted a protracted investigation along a length of coastal bluff on the northeast shore, referred to as Iggy Hill. Our work identified an inferred gravel resource of approximately 710,000 cubic yards, in two adjacent areas, separated by an incised gully, near the bluff. Material extraction from this location will be complicated by the necessity of removing handling 11-ft to 50-ft of ice rich silt overburden. The site lies within a quarter mile of the coast and runoff from the site will flow directly into Hotham Inlet by way of steep gradient gullies.

In April of 2010, we conducted an investigation at Cape Blossom, drilling 25 test holes through sea ice, up to one mile off shore, within and adjacent to the area targeted to be dredged for a deep water harbor. This drilling addressed the two fold needs of describing the soil within future harbor and confirming the presence of sea floor gravel indicated by three test holes bored by Geode Exploration in 1984. The results of previous drilling could not be confirmed and no usable material was identified.

Figure 2. Looking south at Iggy Hill

Introduction

Exploration at Iggy Hill began with four test holes drilled in April 2009, along the top of the bluff. These encountered no gravel within 22-ft of the surface. Surface sampling in September 2009, identified numerous gravel layers exposed in the bluff. The highest exposure observed, suggested that gravel might be present behind the bluff at depths ranging from 40-ft to 65-ft.

Five test holes were drilled in December of 2010, along the bluff to depths up to 99-ft. Two holes, TH10-621 and TH10-622, encountered silt with gravel and gravely silt interbedded with silt, at depths between 54-ft and 89-ft. Only one hole, TH10-624, returned promising results, encountering continuous gravel from 20-ft to the bottom of the hole at 49-ft. This test hole was centered in a small hill near the southern end of the previous drilling.

Fourteen test holes were drilled in March 2011. Eleven holes (TH11-500 thru TH11-504 and TH11-508 thru TH11-513) were centered around the small hill and three holes (TH11-505 thru TH11-507) were located at the edge of the bluff, adjacent to previous drilling. Gravel was encountered shallower than 50-ft in two areas:

- Within the geographic extent of a small hill where the top of the gravel layers were observed at depths ranging from 11-ft to 39-ft, and gravel thicknesses were observed ranging from 10-ft to over 89-ft.
- Along the edge of the bluff, from 500-ft to 1500-ft north of the small hill, where the top of the gravel layers were observed at depths ranging from 31-ft to 48-ft, and gravel thicknesses were observed ranging from 50-ft to over 63-ft.

The materials source information included in this report is for the purpose of assisting in the project design process. It does not signify that the source is available or suitable for use during the construction of any current or future project. This Geotechnical Report does not determine source availability or suitability for any construction project; it only provides information that can be used to make that determination during the project design process. Sources available or suitable for use for a construction project will be specified in the appropriate section of the Plans and Specifications of the Contract Documents for the construction project.

Expected Physical Site Conditions

Based on variability common in natural environments, climate of the project area and conditions observed in this investigation, anticipate the following physical conditions:

1. Expect permafrost to be present at any location or depth throughout the area.
2. Expect that frozen ground may be present in the seasonal frost layer at any time of year.
3. Expect that ice-rich soil will be very wet and unstable upon thawing.
4. Material quality is variable over the site.
5. Expect organic material to be present in coarse aggregate material.

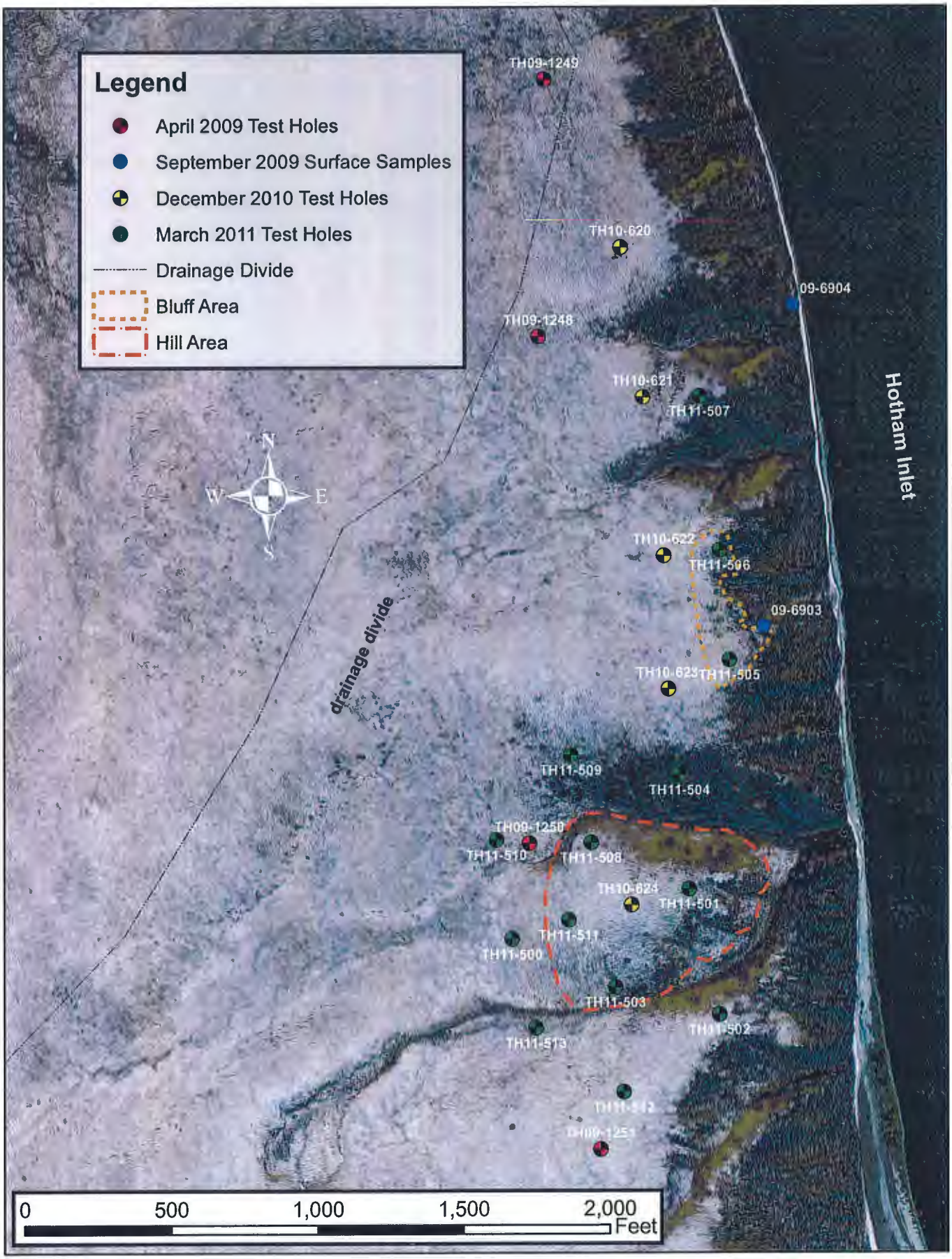


Figure 3. Iggy Hill Test Hole and Sample Locations

Iggy Hill Site

Location and Access

The Iggy Hill Material site lies about 8 miles east of Kotzebue, AK. No year round access has been established to the site. Winter access is by over land trail or by a 12 mile sea ice trail around the north tip of the peninsula. It is located in, Section 36, T18N, R17W, Sec. 36, Kateel River Meridian, on a coastal bluff, about 200-ft above sea level (Figure 2). The material identified at this site is situated in two adjacent areas, separated by an incised gully. One is within the geographic extent of a small **hill** abutting the bluff, encompassing approximately 8.25 acres and the other is to the north, along the edge of the **bluff**, encompassing approximately 1.7 acres.

Land Status

The site lies within land jointly held by Nana Corporation and Kikiktagruk, Inc.

Clearing and Stripping

The overburden at the site consists of the 2-in vegetative mat overlaying 11-ft to 50-ft of frozen silt, with low to high organic content and occasional interbedded, 6-in to 12-in layers of silt with sand and gravel, ranging in moisture content from moist to wet. Wet silt was commonly Nbe (bonded soil with non-visible, excess ice). This soil is over saturated and will flow upon thawing.

We observed massive ice overlying gravel in two test holes. TH11-508, in the hill area, encountered a layer composed of 50% to 100% stratified ice up to 15-ft thick within the overlying silt. Similar soil was observed in the non-gravel holes drilled around the periphery of the hill. TH11-507, in the bluff area, encountered a layer composed of 75% to 95% stratified ice up to 22-ft thick within the overlying silt. Overburden in the bluff area thins to 0-ft out on the bluff face to the east and apparently thickens to the west. Some of the ice rich overburden may require removal, depending on the design stripping ratios for the final pit. None of the overburden is suitable for construction use.

A stripping ratio between 1:1 and 1.5:1 (1 ton of overburden per 1 to 1.5 tons of gravel) is indicated for complete extraction of the gravel. The stripping ratio will be higher for partial extraction of gravel.

Water Table

No water table was observed.

Frozen Ground

All holes were found to be frozen from the surface, to the bottom of the hole.

Exploration Method

NRMS personnel; geologist - K. Maxwell, driller - S. Parker and drillers helper - P. Lanigan, explored the site by drilling ten test holes using a track-mounted CME 45B with a six-inch solid flight auger. Test holes were generally discontinued if no gavel was encountered above 49-ft, and drilled up to 100-ft if gravel was encountered. Samples collected from auger cuttings, were analyzed for natural moisture, organic content, classification, proctor or quality. The soil samples were submitted to Mappa Materials Laboratory for testing. Hole locations were determined using a Garmin GPS 72

with an accuracy of +/- 50-ft. Test holes were marked with labeled lath and orange flagging. Map datum is NAD 83.

Subsurface Findings

Hill Area Material Identified

Eleven test holes (TH11-500 thru TH11-504 and TH11-508 thru TH11-513) were drilled in the vicinity of the small hill where shallow gravel was encountered in TH10-624, during December 2010 drilling. Four holes, in addition to TH10-624 (TH11-501, TH11-503, TH11-508 and TH11-511), all located within the geographic extent of the small hill, encountered gravel shallower than 49-ft.

In these five holes, upper contacts with the gravel layers were observed at depths ranging from 11-ft to 35-ft, and gravel thicknesses were observed ranging from 17-ft to over 89-ft. Soil encountered within the gravel interval include; gravel with varying amounts of silt and sand, sand with varying amounts of silt and gravel and some silt with gravel. The majority of the gravel encountered, is associated with silt. Gravel was typically rounded to sub-angular, -2", composed of varying lithologies and degrees of weathering, though mostly competent. Layers of cobbles, 5-ft to 15-ft thick, were associated with gravel bearing soils in all test holes. These soils tended to be well drained with moisture content typically moist or moist to wet. No visible ice was observed within the gravel layers.

We observed no gravel in the other six holes, all located beyond the extent of the small hill and drilled to depths of 44-ft to 69-ft.

Table 1. Test Hole Gravel Intercepts

Area	Test Hole	Total Depth	Gravel Interval	Gravel Thickness
Hill	TH10-624	49-ft	20-ft to >49-ft	>29-ft
Hill	TH11-501	79-ft	22-ft to 68-ft	46-ft
Hill	TH11-503	64-ft	33-ft to 50-ft	17-ft
Hill	TH11-508	84-ft	35-ft to 74-ft	39-ft
Hill	TH11-511	100-ft	11 to >100-ft	>89-ft
Bluff	TH11-505	92-ft	31-ft to >92-ft	>61-ft
Bluff	TH11-506	79-ft	46-ft to 78-ft	32-ft
Bluff	TH11-507	59-ft	50-ft to >59-ft	>9-ft
Bluff	TH10-622	89-ft	29-ft to 70.5-ft*	~8-ft
Bluff	TH10-623	89-ft	54-ft to 88-ft	34-ft

* thinly bedded gravel in silt throughout this interval

Bluff Area Material Identified

Two holes (TH11-505 thru TH11-507) were located at the edge of the bluff, adjacent to three, more inland test holes (TH10-621 thru TH10-623) drilled in December 2010. The new drilling was

intended to determine if the gravel, seen in the December, 2010 holes, became more shallow or more abundant with proximity to the bluff. This was indicated by the 2011 test holes.

- TH11-505 encountered a 61-ft thick gravel interval, starting at 31-ft and stayed in gravel or sand with gravel to the bottom of the hole at 92-ft. In contrast, TH10-623, located 230-ft to the west-southwest, encountered only widely spaced 6-in to 1-ft layers of silt with gravel.

- TH11-506 encountered a 32-ft thick gravel interval, starting at 46-ft and stayed in gravel or sand with gravel to 78-ft. TH10-622, located 200-ft to the west, encountered a 29-ft thick gravel interval at 60-ft and stayed in gravel or silt with gravel to the bottom of the hole at 89-ft.

- TH11-507 encountered gravel, starting at 50-ft and stayed in gravel or sand with gravel to the bottom of the hole 59-ft. TH10-621, located 200-ft to the west, encountered an 11-ft layer of gravel, from 74-ft to 85-ft.

Material Characteristics

Gravel layers were spot checked for organic content. Six samples were analyzed and all contained organic matter ranging from 0.7% and 10.7% by weight. It should be considered likely that organic material will be associated with gravel.

Table 2. Material Quality Analytical Results (# of analyses)

Material	NaSO4 Soundness Coarse	LA Abrasion %	Degradation
Auger cuttings and Surface samples	0.04 - 0.65 (3)	21.5 - 26.7 (3)	42 - 85 (3)

Some of this material failed to meet quality specifications for all crushed aggregate products. Two samples (09-6904 from surface and 10-3507 from TH10-624) meet quality specifications for all crushed aggregate products. Two samples (11-3001 from TH11-501 and 11- 3022 from TH11-511) failed to meet specifications for cover coat and surface treatment. One sample (11-3006 from TH11-503) failed to meet specifications for cover coat, surface treatment, surface course and base course.

Table 3. Silt and Sand Content of Gravel Samples (# of analyses)

Material	Percentage of Material Passing the #200 Screen (Silt)	Percentage of Material Passing the #4 Screen (Sand)
Auger cuttings	5.5 – 45.0 (20)	17 – 80 (20)
Surface samples	2.4 – 4.5 (2)	35 – 59 (2)

19 samples failed to meet specifications for select type A because they had excessive silt content and 16 samples had sand content outside the specified range. 19 samples failed to meet specifications for select type B. Reported fines content may be over stated due to potential for grinding of frozen gravel in the drilling process, and sample contamination from overlying silt.

Table 4. Moisture Content for Optimal Compaction

Parameter	Sample 11-3012	Sample 11-3016
Pounds / cubic foot	143.5	139.0
% moisture content	6.1	7.3

Proctor analysis was conducted on two samples. Graphic results can be seen in Appendix B.

Available Material

The inferred gravel resource at Iggy Hill material site is estimated at approximately 710,000 cubic yards. This includes material from both the hill area and the bluff area.

In the four test holes drilled in the hill area, we observed an average gravel thickness of 43-ft. The area shown in figure 3, bordered by the dashed line, encompasses an area of about 8.25 acres. If gravel encountered in the test holes, within this area is continuous between test holes and out to the dashed line, an inferred resource of 560,000 cubic yards could be present.

In the two test holes drilled in the bluff area, we observed an average gravel thickness of 54-ft. The area shown in figure 3, bordered by the dotted line, encompasses an area of about 1.7 acres. If gravel encountered in the test holes, within this area is continuous between test holes and out to the dotted line, an inferred resource of 150,000 cubic yards could be present.

This estimate is based on gravel bearing soils which may be accessed within 50-ft of the surface and within 75-ft of the bluff. If thicker overburden is stripped to the west, the resource should expand. Gravel generally occurs deeper to the north and shallows to the south. This is indicated by depth of gravel occurrence in TH11-505, TH11-506 and TH11-507.

Mining Considerations

- Examine gravel and extent on the bluff face to the east of the areas, to better refine the inferred gravel thickness. This was not possible during this investigation due to snow cover.
- Mined overburden composed of ice-rich silt, will not be stable on thawing. Consider overburden placement at least 1000-ft to the west, across the drainage divide, to afford more options for control of silt rich runoff.
- The pit floor should slope west, into the hill side, to create a catchment basin for the runoff as the exposed, ice rich material melts.
- Steep pit walls will reduce overburden volume, however they will be unstable during the summer and slough into the pit, diluting or burying any remaining material.
- Winter mining and haulage is recommended to reduce waste dilution of aggregate material and to allow for the possibility of overland ice road or sea ice haulage.

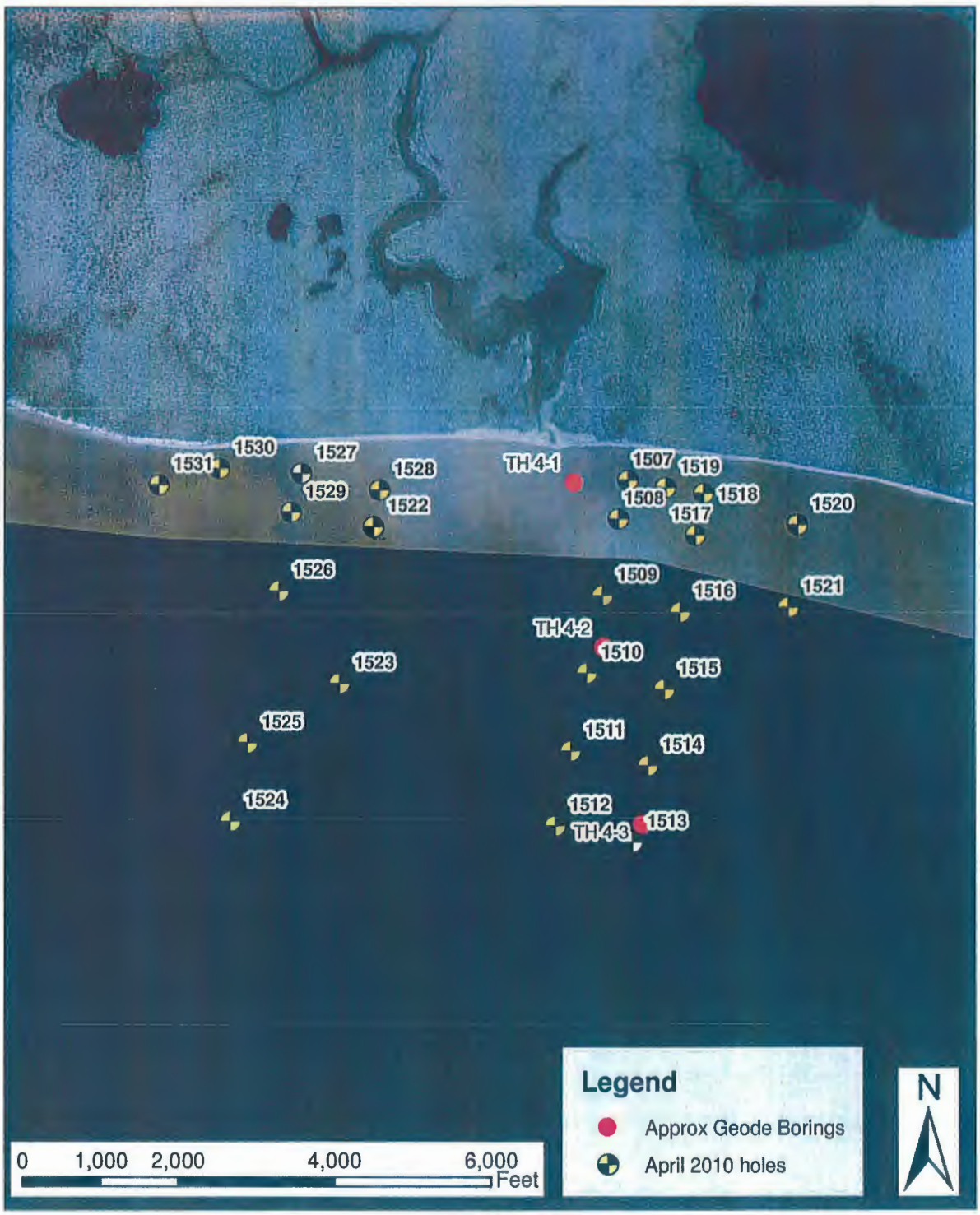


Figure 4. Cape Blossom Test Hole Locations

Cape Blossom Offshore Drilling

Exploration Method

During April 10 to April 16, 2010 NRMS personnel drilled 25 solid and hollow stem auger test holes to depths of 22 to 34 feet in the vicinity of the planned deep water harbor, near Cape Blossom. The drill crew consisted of J. Cline, G. Nelson and S. Masterman. A CME-45B drill mounted on a Bombardier track carrier, was used. Hollow stem auger holes were 6.5" in diameter. Standard penetration tests were driven every five feet with a 1.375" ID spoon and a 140 pound cathead and rope safety hammer. Solid stem auger holes were 6" in diameter. Samples retrieved from the split spoons were logged and sampled, and analyzed by the Northern Regional Materials Laboratory for classification. Logged changes in soils between split spoon samples are based on drill reaction. All depths are from the top of ice surface. In all test holes sea water rebounded to about 4-6" below the top of the sea ice. Test hole locations were recorded in NAD83 coordinates on a Garmin 72 GPS.

Figure 5. Looking west from Cape Blossom

Subsurface Findings

Most of the test holes intersected slightly organic to organic silt and fine sand with only a few thin intervals with gravel. The typical soil profile was 1-ft to 3-ft of sand with minor pea-sized gravel to coarse sand occurred over silt and fine sand to the depths drilled. Most test holes were drilled to 34 feet from the top of ice. Shell fragments were observed throughout the soils. Silts were generally dark grey to dark brown to black, frequently laminated and contained thin sand as well as sporadic peat intervals.

Test holes 10-1507 to 10-1519 were hollow-stem auger holes. In most test holes, a SPT test was conducted at the sea floor, then every 5 feet. Blow counts did not vary greatly, showing the relative density of the silt to be loose, with occasional intervals classifying as very loose or medium dense.

Silts were moist, while sands were wet and looser. Heaving was minimal and spoons were generally 60-100% filled.

A single grain of gravel too large to enter the split spoon was encountered, though we did not intersect any cobbles. Any cobbles present however, could easily be pushed aside by the drill bit without resulting in a noticeable drill reaction. Cobbles up to 10" in diameter can be seen in the cliffs at Cape Blossom, so may be present in the sediments.

Test holes 10-1520 to 10-1531 were 6-in solid stem auger holes drilled in attempt to locate gravel after not finding it along the original alignment. Material interpreted as till, silt with sand and gravel occurred in intervals of several feet thick closer to the Cape. Only one test hole (10-1527) contained an appreciable thickness of material suitable for road construction. This test hole contained clean sand with gravel from 21-ft to 34-ft. Unfortunately, this was beneath 11.5-ft of silt and was not encountered in neighboring test holes.

Drill results did not verify the 1984 Geode Exploration data, which showed "gravelly sand" to depths of greater than 20 feet below the sea floor in the area of the proposed dredge channel. Figure 4 shows the approximate position of the Geode test sites. No extractable volume of material suitable for construction was observed in the Cape Blossom offshore drilling.

References

Alaska DOT&PF, 2003, Alaska Field Rock Classification and Structural Mapping Guide, p2.5 – p2.7.

Green, James, P., 2004, Standard Specifications for Highway Construction, Alaska DOT&PF, p343 – p344.

Nelson, L., 1984, Kotzebue Aggregate Exploration Dredge Sites Final Report. Geode Exploration.

APPENDIX A

IGGY HILL DRILL LOGS

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	09-1248
Project Number	AKSAS 76884	Total Depth	26 feet
Field Geologist	J. ROWLAND	Dates Drilled	4/20/2009
Field Crew	T. JOHNSON, S. PARKER	Station, Offset	
Equipment Type	Mobile B-24	Latitude, Longitude	N66.92519°, W162.28958°
Weather	Sunny,10 mph, 15 F	Elevation	180.0
TH Finalized By	J ROWLAND	Vegetation	6 inches snow

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
NORTHEAST COAST FOR MS

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log
S-S Auger	0–26								

SUBSURFACE MATERIAL

0 ORG MAT

1 Bn-Gy SILT
Org, Vs, to Nbe

26 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	09-1249
Project Number	AKSAS 76884	Total Depth	22 feet
Field Geologist	J. ROWLAND	Dates Drilled	4/21/2009
Field Crew	T. JOHNSON, S. PARKER	Station, Offset	
Equipment Type	Mobile B-24	Latitude, Longitude	N66.92757°, W162.28947°
Weather	Fog, clouds, breezy, 10 F	Elevation	180.0
TH Finalized By	J ROWLAND	Vegetation	6 inches snow

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
NORTHEAST COAST FOR MS

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value

Casing Blows / ft | Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth in (Feet)	
0	ORG MAT
1	Bn-Gy SILT
2	*Org*, Vs, to Nbe
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	09-1250
Project Number	AKSAS 76884	Total Depth	22 feet
Field Geologist	J. ROWLAND	Dates Drilled	4/21/2009
Field Crew	T. JOHNSON, S. PARKER	Station, Offset	
Equipment Type	Mobile B-24	Latitude, Longitude	N66.92048°, W162.28975°
Weather	Fog, clouds, breezy, 10 F	Elevation	180.0
TH Finalized By	J ROWLAND	Vegetation	1 ft snow

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
NORTHEAST COAST FOR MS

Drilling Method | Depth in (Feet) | Casing Blows / ft | Sample Data: Method, Number, Blow Count, Sample Interval, N-Value | Frozen | Graphic Log

S-S Auger

SUBSURFACE MATERIAL

0 ORG MAT

Bn-Gy SILT
Org, Vs

22 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	09-1251
Project Number	AKSAS 76884	Total Depth	22 feet
Field Geologist	J. ROWLAND	Dates Drilled	4/21/2009
Field Crew	T. JOHNSON, S. PARKER	Station, Offset	
Equipment Type	Mobile B-24	Latitude, Longitude	N66.91765°, W162.28804°
Weather	P. cloudy, 10 mph, 15 F	Elevation	205.0
TH Finalized By	J ROWLAND	Vegetation	1 ft snow

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
NORTHEAST COAST FOR MS

Drilling Method: S-S Auger

Sample Data: Depth in (Feet); Casing Blows / ft; Method; Number; Blow Count; Sample Interval; N-Value; Frozen; Graphic Log

SUBSURFACE MATERIAL

0 ORG MAT

Bn-Gy SILT
Org, Vs, to Nbe

22 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	09-1252
Project Number	AKSAS 76884	Total Depth	23 feet
Field Geologist	J. ROWLAND	Dates Drilled	4/23/2009
Field Crew	T. JOHNSON, S. PARKER	Station, Offset	
Equipment Type	Mobile B-24	Latitude, Longitude	N66.91284°, W162.40533°
Weather	Snowing, 15 mph, 20 F	Elevation	
TH Finalized By	J ROWLAND	Vegetation	1 ft snow

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
NOTE: THIS TEST HOLE IS LOCATED 1/2 MILE SOUTH OF IGGY HILL, BEYOND THE SCOPE OF FIGURE 3.

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0–1									ORG MAT
	1–4									Bn SILT *Org*, Vs
	4–16									Gy SILT *sl Org*, Nbe, to Vx
	16–23									Wh-Gy ICE
	23									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH10-620
Project Number	AKSAS 76884	Total Depth	99 feet
Field Geologist	K. MAXWELL	Dates Drilled	12/13/2010
Field Crew	J. CLINE, P. LANIGAN	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.92602°, W162.28764°
Weather	Clear, -10 F, 10 mph	Elevation	180.0
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0–2									ORG MAT wet
	2–4									Bn SILT wet, *hi Org*, Nbe
	4–12									Gy-Bn SILT wet, Nbe
	12–33									Gy-Bn SILT moist to wet
	33–37									Gy-Bn Silty SAND moist
	37–45									Gy-Bn SILT w/ Sand wet, Nbe, fine
	45–53									Gy-Bn SILT moist to wet
	53–55									Gy-Bn SILT w/ Sand

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH10-620

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									wet, Nbe, very fine
	56									Gy-Bn PEAT
	57									wet
	58									Gy-Bn SILT
	59									w/ Gravel
	60									wet, Nbe
	61									Gy-Bn PEAT
	62									wet
	63									Bn SILT
	64									wet, *hi Org*, Nbe
	65									Gy-Bn SILT
	66									wet, Nbe
	67									
	68									
	69									
	70									
	71									
	72									
	73									
	74									
	75									
	76									
	77									
	78									
	79									
	80									
	81									Bn SILT
	82									wet, *hi Org*, Nbe
	83									Gy-Bn SILT
	84									wet, Nbe
	85									
	86									
	87									
	88									
	89									
	90									SAMPLE 10-3500 (90.0-94.0):
	91									
	92			AUGER	10-3500					Gy-Bn SILT
	93			AUGER						w/ Gravel
	94									wet, Nbe, -1" rounded
	95				10-3501					SAMPLE 10-3501 (94.0-96.0):
	96									Gy-Bn SILT
	97									wet, Nbe
	98									
	99									BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH10-621
Project Number	AKSAS 76884	Total Depth	89 feet
Field Geologist	K. MAXWELL	Dates Drilled	12/13/2010
Field Crew	J. CLINE, P. LANIGAN	Equipment Type	CME 45B
Station, Offset		Weather	Clear, -10 F, 10 mph
Latitude, Longitude	N66.92463°, W162.28709°	TH Finalized By	K. Maxwell
Elevation	165.0	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Casing Blows / ft | Frozen | Graphic Log

SUBSURFACE MATERIAL

- 0–1: ORG MAT, wet
- 1–4: Bn SILT, wet, *hi Org*, Nbe
- 4–15: Gy-Bn SILT, wet, Vr, 10% to 25% ICE
- 15–22: Bn SILT, wet, *hi Org*, Nbe
- 22–26: Gy-Bn SILT, moist
- 22–25: Bn SILT, moist, *hi Org*
- 25–26: Gy-Bn SILT, moist
- 26–28: Gy-Bn SILT, w/ Sand, moist, fine
- 28–31: Gy-Bn SILT, moist
- 31–36: Gy-Bn Sandy SILT, moist, fine
- 36–51: Gy-Bn SILT, dry to moist
- 51–53: Gy-Bn SILT, w/ Gravel, dry to moist
  SAMPLE 10-3502 (51.0-53.0): 10-3502

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH10-621

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55–89			10-3503 10-3504						Gy-Bn SILT moist, trace gravel -.5" Gy-Bn SILT w/ Gravel moist, -.75" SAMPLE 10-3503 (66.0-69.0): SAMPLE 10-3504 (69.0-74.0): Gy-Bn Gravelly SILT moist Gy-Bn SILT w/ Gravel moist BOH Gy-Bn Gravelly SILT moist Gy-Bn SILT moist

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH10-622
Project Number	AKSAS 76884	Total Depth	89 feet
Field Geologist	K. MAXWELL	Dates Drilled	12/14/2010
Field Crew	J. CLINE, P. LANIGAN	Equipment Type	CME 45B
		Station, Offset	
Weather	Clear, 0 F, 20 mph	Latitude, Longitude	N66.92316°, W162.28658°
TH Finalized By	K. Maxwell	Vegetation	
		Elevation	165.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0–2									ORG MAT wet
	2–4									Bn SILT wet, *hi Org*, Nbe
	4–10									Gy SILT wet, Vr, 15% ice
	10–12									PEAT wet, Nbe
	12–15									Gy-Bn SILT wet, Vr, 15% ice
	15–20									Bn SILT moist, *Org*
	20–27									Gy-Bn SILT moist
	27–37									Gy Sandy SILT moist to wet, very fine
	37–42									Gy SILT moist
	42–54									Gy-Bn SILT dry to moist
	54–55				9					Gy-Bn SILT

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH10-622

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									w/ Gravel
	56									moist, rounded to sub-angular qtz.
	57									SAMPLE 10-3505 (54.0-64.0):
	58									Gy-Bn Gravelly SILT
	59									moist
	60		AUGER	10-3505						Gy-Bn Silty GRAVEL
	61									moist, -.75"
	62									Gy-Bn SILT
	63									w/ Gravel
	64									moist
	65									Gy-Bn Silty GRAVEL
	66									moist, *sl Org*
	67									SAMPLE 10-3506 (64.0-74.0): NM 20.8%, ORG 3.4%
	68		AUGER	10-3506						Gy-Bn SILT
	69									w/ Gravel
	70									moist, *sl Org*
	71									Gy-Bn Silty GRAVEL
	72									moist
	73									Gy-Bn SILT
	74									w/ Gravel
	75									moist
	76									Gy-Bn Gravelly SILT
	77									moist
	78									
	79									
	80									
	81									
	82									
	83									
	84									
	85									
	86									
	87									
	88									
	89									BOH SILT
										w/ Gravel
										moist

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH10-623
Project Number	AKSAS 76884	Total Depth	89 feet
Field Geologist	K. MAXWELL	Dates Drilled	12/15/2010
Field Crew	J. CLINE, P. LANIGAN	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.92192°, W162.28645°
Weather	Clear, -15 F, 10 mph	Elevation	175.0
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method | Depth in (Feet) | Casing Blows / ft | Sample Data: Method, Number, Blow Count, Sample Interval, N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

- ORG MAT — wet
- Bn SILT — wet, *hi Org*, Nbe
- Gy-Bn SILT — wet, Nbe
- Gy-Bn SILT — moist, Nbe
- Gy-Bn SILT — moist to wet, Nbe
- Gy-Bn SILT — wet, Vs
- Gy-Bn SILT w/ Gravel — wet, Nbe, -.5", flat and soft
- Gy-Bn SILT — wet, Nbe
- Gy-Bn SILT w/ Gravel — moist, -.5" angular, schistose, soft
- Gy-Bn SILT — moist
- Gy-Bn SILT w/ Gravel — moist, -.5" rounded
- Gy-Bn SILT — moist
- Gy-Bn SILT w/ Gravel — moist
- Gy-Bn SILT — moist
- Gy-Bn SILT w/ Gravel — moist, -.75" sub-angular

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH10-623

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									Gy-Bn SILT moist
	62									Gy-Bn SILT w/ Gravel moist
	63									Gy-Bn SILT moist
	66									Gy-Bn SILT w/ Gravel moist, -2" angular
	67									Gy-Bn SILT moist
	68									Gy-Bn SILT w/ Gravel moist
	69									Gy-Bn SILT moist
	70									Gy-Bn SILT w/ Gravel moist
	71									Gy-Bn SILT moist
	72									Gy-Bn SILT w/ Gravel moist
	73									Gy-Bn SILT moist, trace gravel, -.5" angular
	74									
	75									
	76									
	77									
	78									
	79									
	80									
	81									
	82									
	83									
	84									
	85									
	86									
	87									
	88									
	89									BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH10-624
Project Number	AKSAS 76884	Total Depth	49 feet
Field Geologist	K. MAXWELL	Dates Drilled	12/16/2010
Field Crew	J. CLINE, P. LANIGAN	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.91991°, W162.28732°
Weather	Clear, -10 F, 20 mph	Elevation	180.0
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0–1									ORG MAT moist to wet
	2–4									Bn SILT moist to wet, *hi Org*, Nbe
	5–11									Gy-Bn SILT moist to wet, Nbe
	12–16									Gy-Bn Silty SAND moist
	17–19									Gy-Bn Poorly-graded SAND w/ Gravel moist
	20–22									Gy SILT wet, Nbe
	23–29		AUGER	10-3507						Gy-Bn Silty GRAVEL w/ Sand moist, -1" SAMPLE 10-3507 (20.0-29.0): GM, 13.2% -200, SSc 1.3, SSf 2.2, LA 24, DEG 85, LL 18, NP
	30–33		AUGER	10-3508						Gy-Bn Silty SAND w/ Gravel moist, -1.5" SAMPLE 10-3508 (29.0-33.0): SM, 18.9% -200, LL 17, NP
	34–37									Gy-Bn Poorly-graded GRAVEL w/ Silt & Sand w/ Cobbles moist, -2.5"
	38–49		AUGER	10-3509						SAMPLE 10-3509 (39.0-49.0): SM, 27.9% -200, LL 17, NP BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: TH11-500
Total Depth: 49 feet
Dates Drilled: 3/6/2011
Station, Offset:
Latitude, Longitude: N66.91959°, W162.29016°
Elevation: 175.0

Field Geologist: K. MAXWELL
Field Crew: S. PARKER, P. LANIGAN
Equipment Type: CME 45B
Weather: Clear, -5 F, calm
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0									ORG MAT
	1									Bn SILT moist to wet, *hi Org*
	2									
	3									
	4									Gy SILT wet, Nbe
	5									
	6									Bn SILT moist to wet, *hi Org*
	7									
	8									Gy-Bn SILT wet, *Org*, with .5" peat layers
	9									
	10									
	11									
	12									
	13									
	14									
	15									Gy-Bn SILT wet
	16									
	17									
	18									
	19									
	20									
	21									
	22									Gy-Bn SILT w/ Sand wet, fine
	23									
	24									Gy-Bn Silty SAND moist to wet, fine
	25									
	26									Tn Poorly-graded SAND moist to wet, fine
	27									
	28									Gy Silty SAND moist to wet, fine
	29									
	30									Gy SILT w/ Sand wet, fine
	31									
	32									Gy SILT dry to moist
	33									
	34									
	35									
	36									
	37									
	38									
	39									
	40									
	41									
	42									
	43									
	44									
	45									
	46									
	47									
	48									
	49									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-501
Project Number	AKSAS 76884	Total Depth	79 feet
Field Geologist	K. MAXWELL	Dates Drilled	3/6/2011
Field Crew	S. PARKER, P. LANIGAN	Equipment Type	CME 45B
Station, Offset		Weather	Clear, -5 F, calm
Latitude, Longitude	N66.92006°, W162.28595°	TH Finalized By	K. Maxwell
Vegetation		Elevation	170.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0									ORG MAT
	2									Gy SILT wet, Vs, 25% ice
	3									Gy-Bn SILT wet, *Org*, Vs, 5% to 25% ice
	7									Bn SILT wet, *hi Org*, Nbe
	9									Gy-Bn Sandy SILT w/ Gravel wet, 10% ice, -.75"
	13									Gy-Bn Silty SAND wet, Vs, 10% ice
	15		AUGER	11-3000						Gy-Bn Poorly-graded GRAVEL w/ Silt & Sand w/ Cobbles wet, -2"
	19									SAMPLE 11-3000 (15.0-19.0): GM, 32.5% -200, NV, NP
	20									Gy-Bn SILT w/ Gravel wet
	22									Gy-Bn Sandy SILT wet
	25		AUGER	11-3001						Gy-Bn Silty GRAVEL w/ Sand moist to wet, -2"
	26									SAMPLE 11-3001 (22.0-31.0): GM, 21.7% -200, SSc 0.7, SSf 0.0, LA 22, DEG 50, NV, NP
	31									Gy-Bn Poorly-graded GRAVEL w/ Silt & Sand moist to wet, -.75" to -2"
	34		AUGER	11-3002						SAMPLE 11-3002 (31.0-44.0): GP-GM, 10.2% -200, SSc 0.1, SSf 0.0, LA 22, DEG 50, NV, NP
	54									Gy-Bn Sandy SILT
	55									

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-501

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55–79		AUGER	11-3003						w/ Gravel moist, -.375" to -.75" SAMPLE 11-3003 (54.0-59.0): SM, 24.4% -200, NV, NP
			AUGER	11-3004						SAMPLE 11-3004 (74.0-77.0): SM, 24.4% -200, NV, NP
										Gy-Bn Silty SAND moist to wet, coarse
										BOH

NR AKDOT TEST HOLE LOG - USCS_KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-502
Project Number	AKSAS 76884	Total Depth	49 feet
Field Geologist	K. MAXWELL	Dates Drilled	3/7/2011
Field Crew	S. PARKER, P. LANIGAN	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.9189°, W162.28522°
Weather	Clear, -5 F, calm	Elevation	165.0
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method | Depth in (Feet) | Casing Blows / ft | Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	
0	ORG MAT
1	Gy-Bn SILT moist
5	Gy SILT moist
7	ICE w/ Silt Vs
18	Gy-Bn SILT wet, *Org*
23	Gy-Bn SILT wet, *Org*, Vs, 80% ice
35	ICE w/ Silt Vs
39	Gy-Bn SILT wet, *hi Org*, Vs
42	
49	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-503
Project Number	AKSAS 76884	Total Depth	64 feet
		Dates Drilled	3/7/2011
Field Geologist	K. MAXWELL	Station, Offset	
Field Crew	S. PARKER, P. LANIGAN	Equipment Type	CME 45B
Weather	Clear, -5 F, calm	Latitude, Longitude	N66.91915°, W162.2877°
TH Finalized By	K. Maxwell	Vegetation	
		Elevation	160.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Depth (Feet)	Sample Data: Method	Number	Graphic Log	SUBSURFACE MATERIAL
0				ORG MAT
1				Gy-Bn SILT moist
2				Bn SILT moist, *Org*
3				Gy-Bn SILT wet, *sl Org*
4				
5				
6				
7				
8				
9				
10				
11				Gy-Bn Silty SAND moist, fine
12				
13				
14				
15				
16				
17				
18				
19				Gy Poorly-graded SAND w/ Silt moist, fine
20				Gy-Bn SILT wet, Nbe
21				Gy SILT moist
22				Gy-Bn SILT wet, Nbe
23				Gy-Bn SILT w/ Gravel moist
24				Gy SILT moist
25				Gy-Bn SILT w/ Gravel moist, -.75"
26				Gy-Bn Silty GRAVEL w/ Sand moist, -2"
27				SAMPLE 11-3005 (34.0-39.0): GM, 33% -200, NV, NP
28				Gy-Bn Silty GRAVEL w/ Sand w/ Cobbles moist, -2.5"
29				SAMPLE 11-3006 (39.0-44.0): ML, 52.5% -200, LA 22, DEG 42, NV, NP
30				SAMPLE 11-3007 (44.0-49.0): GW-GM, 5.5% -200, NV, NP
31				
32				
33				
34	AUGER	11-3005		
35				
36				
37				
38				
39				
40	AUGER	11-3006		
41				
42				
43				
44				
45				
46	AUGER	11-3007		
47				Gy-Bn Poorly-graded GRAVEL w/ Silt moist, -.75"
48				Gy-Bn Silty SAND moist to wet, -.25"
49				Gy SILT moist to wet
50				
51				
52				
53				
54				
55				

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-503

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									55
	56									56
	57									57
	58									58
	59									59
	60									60
	61									61
	62									62
	63									63
	64									BOH 64

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-504
Project Number	AKSAS 76884	Total Depth	69 feet
Field Geologist	K. MAXWELL	Dates Drilled	3/8/2011
Field Crew	S. PARKER, P. LANIGAN	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.92112°, W162.28619°
Weather	Clear, -5 F, calm	Elevation	160.0
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Columns: Drilling Method | Depth in (Feet) | Casing Blows / ft | Sample Data: Method, Number, Blow Count, Sample Interval, N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Material
0 – 1	ORG MAT
1 – 3	Gy-Bn SILT wet, *hi Org*, Nbe
3 – 5	Gy SILT wet, Nbe
5 – 7	Gy-Bn SILT moist, *Org*
7 – 10	Bn SILT wet, *hi Org*, Nbe
10 – 15	Gy-Bn SILT wet, *Org*, Nbe
15 – 21	Gy-Bn SILT moist, *Org*
21 – 27	ICE w/ Silt
27 – 52	Gy-Bn Silty SAND moist to wet, fine
52 – 55	Gy-Bn Sandy SILT moist to wet

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-504

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									55
	56									56
	57									57 Gy-Bn SILT wet, Nbe, -1"
	58									58
	59									59
	60									60
	61									61
	62									62
	63									63 Gy-Bn SILT w/ Gravel w/ Cobbles wet
	64									64
	65									65
	66									66 Gy-Bn SILT wet, Nbe
	67									67
	68									68
	69									69 BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-505
Project Number	AKSAS 76884	Total Depth	92 feet
Field Geologist	K. MAXWELL	Dates Drilled	3/8/2011 - 3/10/2011
Field Crew	S. PARKER, P. LANIGAN	Equipment Type	CME 45B
Station, Offset		Weather	Clear, -5 F, calm
Latitude, Longitude	N66.92219°, W162.28501°	TH Finalized By	K. Maxwell
Vegetation		Elevation	165.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0									ORG MAT
	1									Tn SILT moist
	2									
	3									Gy-Bn SILT moist, *sl Org*
	4									
	5									
	6									
	7									
	8									
	9									
	10									
	11									
	12									
	13									
	14									
	15									
	16									Gy-Bn Sandy SILT moist to wet, fine
	17									
	18									
	19									
	20									
	21									
	22									
	23									
	24									
	25									
	26									
	27									Gy-Bn SILT w/ Gravel moist, -1"
	28									
	29									
	30									Gy-Bn SILT moist
	31									
	32									Gy-Bn Silty GRAVEL w/ Sand moist, -2"
	33									
	34		AUGER	11-3008						
	35									SAMPLE 11-3008 (31.0-39.0): GM, 26.7% -200, NV, NP
	36									
	37									
	38									
	39									
	40									Gy-Bn Poorly-graded GRAVEL moist, -.5"
	41									
	42									SAMPLE 11-3009 (40.0-49.0): SM, 45% -200, NV, NP
	43									Gy-Bn Silty GRAVEL w/ Sand moist, -1"
	44									
	45		AUGER	11-3009						
	46									Gy-Bn Gravelly SILT w/ Sand moist to wet, -1.5"
	47									
	48									
	49									
	50									Gy-Bn Silty GRAVEL w/ Sand moist, -2"
	51									
	52									SAMPLE 11-3010 (50.0-59.0): GM, 18.4% -200, NV, NP
	53									
	54		AUGER	11-3010						
	55									

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS_KOTZ CAPE BLOSSOM.GPJ_NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-505

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									
	56									
	57									
	58									
	59									
	60									Gy-Bn Silty GRAVEL
	61									w/ Sand
	62									moist, -1.5" to -.75", coarse
	63									SAMPLE 11-3011 (59.0-64.0): SM, 19.5% -200, NV, NP
	64		AUGER	11-3011						
	65									
	66									
	67									
	68									
	69									
	70									
	71									
	72									
	73									Gy Silty GRAVEL
	74									w/ Sand
	75									w/ Cobbles
	76									moist, -2"
	77									
	78									
	79									
	80									
	81									
	82									
	83									Gy Silty GRAVEL
	84									w/ Sand
	85									moist, -1"
	86									
	87									
	88									
	89									
	90									
	91									
	92									EOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: TH11-506
Total Depth: 89 feet
Dates Drilled: 3/11/2011
Station, Offset:
Latitude, Longitude: N66.92321°, W162.28525°
Elevation: 165.0

Field Geologist: K. MAXWELL
Field Crew: S. PARKER, P. LANIGAN
Equipment Type: CME 45B
Weather: Clear, -10 F, 10 mph
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0									ORG MAT
	3									Bn SILT moist, *Org*
	5									Bn SILT wet, *hi Org*
	6									Bn SILT moist, *Org*
	7									Gy-Bn SILT wet, *sl Org*, Nbe, 10% to 25% ice
	16									Gy-Bn SILT w/ Sand wet, Nbe, fine
	21									Gy-Bn Gravelly SILT w/ Sand wet, fine, -1" ~5% ice
	27									Gy-Bn SILT moist
	32									Gy-Bn Gravelly SILT moist, -2"
	34									Gy-Bn SILT moist
	35									Gy-Bn Silty GRAVEL moist
	37									Gy-Bn SILT moist
	38									Gy-Bn Silty GRAVEL moist, -.75" to -2"
	39									Gy-Bn SILT w/ Sand wet, -.375"
	43									Gy-Bn Silty SAND w/ Gravel moist, -.75"
	45		AUGER	11-3012						Gy-Bn Silty GRAVEL w/ Sand moist. *Org*. -1"
	49		AUGER	11-3013						SAMPLE 11-3013 (49.0-54.0): GM, 21.7% -200, NM 16.6%, ORG 7.6%, NV, NP
	55									

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-506

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55									Gy-Bn Poorly-graded SAND w/ Gravel dry to moist
	56									
	57									
	58									
	59									
	60									
	61									Gy-Bn Silty SAND w/ Gravel moist, -.75" to -1.5"
	62									
	63									
	64									
	65									SAMPLE 11-3014 (65.0-69.0): SM, 33.9% -200, NV, NP
	66									
	67									
	68									
	69									
	70									
	71									
	72									
	73									
	74									
	75									Gy-Bn Gravelly SILT w/ Sand moist, -.75"
	76									
	77									Gy-Bn Silty GRAVEL w/ Sand moist to wet
	78									
	79									Gy-Bn Silty SAND moist to wet, -.375"
	80									
	81									Gy-Bn Silty SAND w/ Gravel moist to wet, -.75"
	82									
	83									Gy-Bn Silty SAND moist to wet, coarse
	84									
	85									Gy-Bn Silty SAND w/ Gravel moist to wet, -.75"
	86									
	87									Gy-Bn Silty SAND moist to wet, coarse
	88									
	89									BOH

AUGER

11-3014

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Field Geologist	K. MAXWELL	Project	Kotzebue to Cape Blossom Road
Field Crew	S. PARKER, P. LANIGAN	Project Number	AKSAS 76884
TH Finalized By	K. Maxwell	Equipment Type	CME 45B
		Weather	Clear, -5 F, calm
		Vegetation	

Test Hole Number	TH11-507
Total Depth	59 feet
Dates Drilled	3/12/2011
Station, Offset	
Latitude, Longitude	N66.92464°, W162.28574°
Elevation	165.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Columns: Drilling Method | Depth in (Feet) | Casing Blows / ft | Sample Data: Method, Number, Blow Count, Sample Interval, N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Description
0–1	ORG MAT
1–4	Bn SILT wet, *hi Org*, Nbe
4–7	ICE wet, Vs, 95% ice
7–24	Gy-Bn SILT w/ Sand wet, *sl Org*, fine, 25% to 75% ice
24–32	Gy-Bn Poorly-graded SAND w/ Silt moist to wet, *sl Org*, fine
32–42	Gy-Bn SILT w/ Sand moist to wet, *sl Org*, fine
42–45	Gy-Bn SILT w/ Gravel moist to wet, -.375"
45–48	Gy-Bn SILT moist to wet
48–51	Gy-Bn SILT w/ Gravel moist to wet, -.75"
51–53	Gy-Bn Gravelly SILT moist to wet, -.75"
53–55	Gy-Bn Silty SAND w/ Gravel

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-507

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55		AUGER	11-3015						moist, *Org*, -2"
	56									SAMPLE 11-3015 (52.0-59.0): SM, 37.9% -200, NM 18.2%, ORG 10.7%, LL 22, PI 1
	57									
	58									
	59									BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-508
Project Number	AKSAS 76884	Total Depth	84 feet
Field Geologist	K. MAXWELL	Dates Drilled	3/12/2011 - 3/13/2011
Field Crew	S. PARKER, P. LANIGAN	Equipment Type	CME 45B
Station, Offset			
Weather	Clear, -5 F, calm	Latitude, Longitude	N66.92049°, W162.28829°
TH Finalized By	K. Maxwell	Vegetation	
Elevation	170.0		

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0									ORG MAT
	1–17									Gy-Bn SILT moist, *sl Org*
	18–23									ICE Vs, 95% ice
	24–30									Gy-Bn SILT wet, *Org*
	31–34									Gy-Bn SILT w/ Gravel wet, -2", 25% ice
	35–39		AUGER	11-3016						Gy-Bn Silty GRAVEL w/ Sand wet, *Org*, Nbe, -2" SAMPLE 11-3016 (35.0-39.0): GM, 35.4% -200, NM 27.0%, ORG 9.8%, NV, NP
	40–44		AUGER	11-3017						SAMPLE 11-3017 (39.0-44.0): 10.1% -200 Gy-Bn Poorly-graded GRAVEL w/ Sand moist to wet, -2.5"
	45–54									Gy-Bn Poorly-graded GRAVEL
	55									

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-508

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55–84		AUGER	11-3018						w/ Sand w/ Cobbles moist to wet, coarse, -2", 5" to 6" cobbles Gy-Bn Silty SAND w/ Gravel w/ Cobbles moist to wet, -2" SAMPLE 11-3018 (67.0-74.0): 28.6% -200 Gy-Bn Gravelly SILT w/ Sand moist to wet, -2", 8" cobbles BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: TH11-509
Total Depth: 49 feet
Dates Drilled: 3/13/2011
Field Geologist: K. MAXWELL
Field Crew: S. PARKER, P. LANIGAN
Equipment Type: CME 45B
Station, Offset:
Weather: Clear, -5 F, 5 mph
Latitude, Longitude: N66.9213°, W162.28878°
TH Finalized By: K. Maxwell
Vegetation:
Elevation:

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Size Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Run Data: Run Number	Time (minutes)	RQD	Recovery	Longest Pc. (in.)	Structural Data	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0															ORG MAT
	1–2															PEAT moist to wet
	3–5															Bn SILT dry to moist, *hi Org*
	6–7															Gy-Bn SILT wet, Nbe
	8–15															Bn SILT moist to wet, *hi Org*, Nbe
	16–19															Gy-Bn Sandy SILT wet, fine
	20–30															Gy Silty SAND wet, Nbe, -.5"
	31															Gy Poorly-graded SAND w/ Gravel moist to wet
	32–34															Gy-Bn Sandy SILT wet, Nbe
	35–37															Gy-Bn Sandy SILT w/ Gravel wet
	38–40															Gy-Bn Sandy SILT wet, Nbe
	41–43															Gy-Bn Sandy SILT w/ Gravel wet
	44–45															Gy-Bn Sandy SILT wet
	46–47															Gy-Bn Sandy SILT w/ Gravel wet
	48–49															BOH
																Gy-Bn Sandy SILT wet
																Gy-Bn Sandy SILT w/ Gravel wet
																Gy-Bn Sandy SILT wet

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST CORE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/27/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road
Project Number	AKSAS 76884
Test Hole Number	TH11-510
Total Depth	49 feet
Dates Drilled	3/13/2011
Station, Offset	
Latitude, Longitude	N66.92051°, W162.29054°
Elevation	
Field Geologist	K. MAXWELL
Field Crew	S. PARKER, P. LANIGAN
Equipment Type	CME 45B
Weather	Clear, -5 F, 5 mph
Vegetation	
TH Finalized By	K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Columns: Drilling Method | Depth in (Feet) | Casing Blows / ft | Sample Data (Method, Number, Blow Count, Sample Interval) | N-Value | Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Material
0 – 1	ORG MAT
1 – 3	Bn SILT wet, *Org*
3 – 15	Gy-Bn SILT wet, *Org*
15 – 17	Bn SILT wet, *hi Org*
17 – 20	Gy-Bn SILT moist to wet
20 – 22	Bn SILT wet, *hi Org*, Nbe
22 – 28	Gy-Bn SILT moist to wet
28 – 30	Gy-Bn Sandy SILT moist, fine
30 – 33	Gy-Bn Poorly-graded SAND w/ Silt wet
33 – 42	Gy Poorly-graded SAND moist to wet, fine
42 – 45	Gy Poorly-graded SAND w/ Gravel moist to wet
45 – 47	Gy Poorly-graded SAND moist to wet, fine
47 – 49	Gy-Bn Sandy SILT moist, fine

BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: TH11-511
Total Depth: 100 feet
Dates Drilled: 3/14/2011
Field Geologist: K. MAXWELL
Field Crew: S. PARKER, P. LANIGAN
Equipment Type: CME 45B
Station, Offset:
Weather:
Latitude, Longitude: N66.91977°, W162.28881°
TH Finalized By: K. Maxwell
Vegetation:
Elevation: 183.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0									ORG MAT
	1–4									Gy-Bn SILT moist to wet, *sl Org*
	5–6									Bn SILT moist, *hi Org*
	7–8									Gy-Bn SILT wet, *sl Org*
	9–10									Gy-Bn Poorly-graded SAND wet, fine
	11–13		AUGER	11-3020						Gy-Bn Silty SAND w/ Gravel moist, *sl Org*, -.75"
	14–15									SAMPLE 11-3020 (11.0-19.0): SM, 20.3% -200, NM 12.9%, ORG 0.8%, SSc 0.1, SSf 0.0, NV, NP
	16–18									Gy-Bn SILT w/ Gravel moist, *sl Org*, -.5"
	19–22		AUGER	11-3021						Gy-Bn Silty SAND w/ Gravel moist, *sl Org*, -1.5"
	23–25									Gy-Bn Silty GRAVEL w/ Sand moist, *sl Org*, -2"
	25–26									SAMPLE 11-3021 (19.0-24.0): GM, 15.4% -200, NM 6.4%, ORG 0.7%, NV, NP
	27–28									Gy-Bn Silty SAND w/ Gravel moist, -1"
	30–31									Gy-Bn Silty GRAVEL w/ Sand moist, -1"
	33–35									Gy-Bn Silty SAND w/ Gravel moist, -1"
	36–38									Gy-Bn Silty GRAVEL w/ Sand moist, -1" to-2"
	39–41		AUGER	11-3022						Gy-Bn Silty SAND w/ Gravel moist, -.75"
	42–44									Gy-Bn Silty SAND w/ Gravel moist, -1" to -1.5", coarse
	45									SAMPLE 11-3022 (39.0-44.0): SM, 20.4% -200, LA 27, DEG 46, NV, NP
	54–55									SAMPLE 11-3023 (54.0-59.0): SM, 17.5% -200, NV, NP

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Test Hole Number TH11-511

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	55		AUGER	11-3023						
	56									
	57									
	58									
	59									
	60									
	61									Gy-Bn Silty SAND w/ Gravel moist, -1"
	62									
	63									Gy-Bn Silty GRAVEL w/ Sand moist, -1"
	64									
	65									Gy-Bn Silty SAND w/ Gravel moist, -1"
	66									
	67									
	68									
	69									Gy-Bn Silty GRAVEL w/ Sand moist, *sl Org*, -1" SAMPLE 11-3024 (69.0-74.0): GM, 16.6% -200, NM 6.4%, ORG 0.7%, NV, NP
	70									
	71		AUGER	11-3024						
	72									
	73									
	74									Gy-Bn Poorly-graded SAND w/ Gravel moist, -.75" to -1"
	75									
	76									
	77									
	78									
	79									
	80									
	81									
	82									
	83									
	84									Gy-Bn Silty SAND w/ Gravel moist, -.75"
	85									
	86									
	87									Gy-Bn Poorly-graded SAND w/ Silt & Gravel moist, -.75"
	88									
	89									Gy-Bn Silty SAND w/ Gravel moist, -.75" to -1"
	90									
	91									Gy-Bn Silty GRAVEL w/ Sand moist, -.75"
	92									
	93									
	94									
	95									Gy-Bn Poorly-graded SAND w/ Silt & Gravel moist, -1"
	96									
	97									
	98									
	99									
	100									BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: TH11-512
Total Depth: 44 feet
Dates Drilled: 3/15/2011
Field Geologist: K. MAXWELL
Field Crew: S. PARKER, P. LANIGAN
Equipment Type: CME 45B
Station, Offset:
Weather:
Latitude, Longitude: N66.91818°, W162.28749°
TH Finalized By: K. Maxwell
Vegetation:
Elevation: 190.0

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0–5									ORG MAT Gy-Bn SILT moist to wet
	5–7									PEAT wet
	7–17									Gy-Bn SILT wet, *Org*
	17–20									Bn SILT wet, *hi Org*
	20–24									Gy-Bn SILT moist to wet
	24–31									Bn SILT wet, *hi Org*, with 1" ice layers
	31–35									PEAT wet Bn SILT wet, *Org*, with 1" ice layers
	35–37									Gy-Bn Sandy SILT wet, fine
	37–44									Bn SILT moist to wet, *hi Org*
	44									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS_KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	TH11-513
Project Number	AKSAS 76884	Total Depth	49 feet
Field Geologist	K. MAXWELL	Dates Drilled	3/15/2011
Field Crew	S. PARKER, P. LANIGAN	Equipment Type	CME 45B
Station, Offset		Weather	
Latitude, Longitude	N66.91877°, W162.28958°	TH Finalized By	K. Maxwell
Elevation	160.0	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)		
Time		
Date		
Symbol		

GENERAL COMMENTS:
IGGY HILL MTERIAL SITE

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
	0–1									ORG MAT
	1–3									PEAT wet
	3–6		SS	11-3025						Bn SILT wet, *hi Org*, Nbe SAMPLE 11-3025 (5.0-6.0): NM 24.4%
	6–9									PEAT wet
	9–10									ICE wet
	10–15		AUGER	11-3026						Gy-Bn SILT wet, *Org* ICE wet SAMPLE 11-3026 (10.0-15.0): SM, 22% -200, NV, NP
	15–17									Gy-Bn SILT moist to wet
	17–27									Bn SILT wet, *hi Org* Gy-Bn SILT moist to wet, *Org*
	27–37									Gy-Bn SILT dry to moist, *sl Org*
	37–41									Gy Poorly-graded SAND moist, fine
	41–44									Gy Poorly-graded SAND w/ Silt moist to wet
	44–49									Gy Poorly-graded SAND moist to wet BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 9/28/11

APPENDIX B

IGGY HILL LAB RESULTS

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER: 76884
AKSAS NUMBER:
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: IGGY HILL

TEST HOLE NUMBER		09-6903	09-6904	TH10-622	TH10-624	TH10-624	TH10-624	TH11-507
DEPTH (feet)		0.0-1.0	0.0-1.0	64.0-74.0	20.0-29.0	29.0-33.0	39.0-49.0	52.0-59.0
LATITUDE		N66.9225°	N66.92549°	N66.92316°	N66.91991°	N66.91991°	N66.91991°	N66.92464°
LONGITUDE		W162.28419°	W162.28352°	W162.28658°	W162.28732°	W162.28732°	W162.28732°	W162.28574°
LAB NUMBER		**09-6903**	**09-6904**	**10-3506**	**10-3507**	**10-3508**	**10-3509**	**11-3015**
DATE SAMPLED		24-Sep-09	24-Sep-09	14-Dec-10	16-Dec-10	16-Dec-10	16-Dec-10	12-Mar-11
% Passing	**3"**	100	100					
	2"	94	84					
	1.5"	88	76		100	100	100	100
Gravel	**1.0"**	82	64		99	99	99	99
	0.75"	79	58		96	98	98	97
	0.5"	72	51		87	92	95	92
	0.375"	68	46		80	87	90	86
	#4	59	35		56	65	74	72
	#8	50	26		36	40	61	63
	#10	48	25		34	39	60	61
	#16	40	18		26	34	53	56
	#30	24	12		21	30	46	51
Sand	**#40**	16	9		20	28	42	49
	#50	11	6		18	26	39	47
	#60	10	5		18	25	37	46
	#80	8	4		16	23	35	44
	#100	7	3		16	22	33	42
Silt/Clay	**#200**	4.5	2.4		13.2	18.9	27.9	37.9
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV		18	17	17	22
PLASTIC INDEX		NP	NP		NP	NP	NP	1
USCS CLASSIFICATION		SP	GW		GM	SM	SM	SM
USCS SOIL DESCRIPTION				(SiGr)				
NATURAL MOISTURE				20.8				18.2
ORGANICS				3.4				10.7
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION			24		24			
DEGRAD. FACTOR			33		85			
SODIUM SULF. (CRSE)					1			
SODIUM SULF. (FINE)					2			
NORDIC ABRASION								
REMARKS				sl Org[1]				Org[1]

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER:
AKSAS NUMBER: 76884
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: IGGY HILL

TEST HOLE NUMBER		TH11-501	TH11-501	TH11-501	TH11-501	TH11-503	TH11-503	TH11-503
DEPTH (feet)		15.0-19.0	22.0-31.0	31.0-44.0	54.0-59.0	34.0-39.0	39.0-44.0	44.0-49.0
LATITUDE		N66.92006°	N66.92006°	N66.92006°	N66.92006°	N66.91915°	N66.91915°	N66.91915°
LONGITUDE		W162.28595°	W162.28595°	W162.28595°	W162.28595°	W162.2877°	W162.2877°	W162.2877°
LAB NUMBER		**11-3000**	**11-3001**	**11-3002**	**11-3003**	**11-3005**	**11-3006**	**11-3007**
DATE SAMPLED		6-Mar-11	6-Mar-11	6-Mar-11	6-Mar-11	7-Mar-11	7-Mar-11	7-Mar-11
% Passing	**3"**							
	2"							
	1.5"			99				
Gravel	**1.0"**	99	98	96	100	99	99	99
	0.75"	95	94	92	99	90	98	93
	0.5"	85	79	76	97	82	95	76
	0.375"	76	71	63	94	69	93	59
	#4	58	57	37	80	59	89	17
	#8							
	#10	51.4	44.9	24.6	58.0	50.4	86.0	8.6
	#16							
	#20	47.8	38.9	19.1	45.0	45.3	79.1	8.0
Sand	**#40**	44.2	34.0	16.3	38.0	41.5	72.1	7.6
	#50							
	#60							
	#80							
	#100	37.1	26.4	12.5	29.0	36.5	60.9	6.3
Silt/Clay	**#200**	32.5	21.7	10.2	24.4	33.0	52.5	5.5
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV	NV	NV	NV	NV	NV
PLASTIC INDEX		NP	NP	NP	NP	NP	NP	NP
USCS CLASSIFICATION		GM	GM	GP-GM		GM	ML	GW-GM
USCS SOIL DESCRIPTION					(SiSa w/Gr)			
NATURAL MOISTURE								
ORGANICS								
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION			22	22			22	
DEGRAD. FACTOR			50	50			42	
SODIUM SULF. (CRSE)			1	0				
SODIUM SULF. (FINE)			0	0				
NORDIC ABRASION								
REMARKS								

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER:
AKSAS NUMBER: 76884
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: IGGY HILL

TEST HOLE NUMBER		TH11-505	TH11-505	TH11-505	TH11-505	TH11-506	TH11-506	TH11-507
DEPTH (feet)		31.0-39.0	40.0-49.0	50.0-59.0	59.0-64.0	49.0-54.0	65.0-69.0	52.0-59.0
LATITUDE		N66.92219°	N66.92219°	N66.92219°	N66.92219°	N66.92321°	N66.92321°	N66.92464°
LONGITUDE		W162.28501°	W162.28501°	W162.28501°	W162.28501°	W162.28525°	W162.28525°	W162.28574°
LAB NUMBER		**11-3008**	**11-3009**	**11-3010**	**11-3011**	**11-3013**	**11-3014**	**11-3015**
DATE SAMPLED		8-Mar-11	8-Mar-11	8-Mar-11	8-Mar-11	11-Mar-11	11-Mar-11	12-Mar-11
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**	100	99	99	100	98	99	99
	0.75"	98	97	95	98	95	94	97
	0.5"	91	91	83	90	86	84	92
	0.375"	83	86	71	82	78	81	86
	#4	62	74	49	61	55	78	72
	#8							62.7
	#10	46.6	68.5	36.6	41.2	43.7	70.2	61.4
	#16							56.2
	#20	39.6	63.0	30.2	34.1	37.3	61.2	
Sand	**#40**	35.7	58.2	26.4	29.8	33.0	53.0	48.9
	#50							46.7
	#60							45.7
	#80							43.5
	#100	30.9	50.7	21.6	23.0	26.3	41.3	42.4
Silt/Clay	**#200**	26.7	45.0	18.4	19.5	21.7	33.9	37.9
Hydro	**0.02**							
	0.005							
	0.002							
	0.001							
LIQUID LIMIT		NV	NV	NV	NV	NV	NV	22
PLASTIC INDEX		NP	NP	NP	NP	NP	NP	1
USCS CLASSIFICATION		GM	SM	GM	SM	GM	SM	SM
USCS SOIL DESCRIPTION								
NATURAL MOISTURE						16.6		18.2
ORGANICS						7.6		10.7
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
NORDIC ABRASION								
REMARKS						Org[1]		Org[1]

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER:
AKSAS NUMBER: 76884
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: IGGY HILL

TEST HOLE NUMBER		TH11-508	TH11-508	TH11-508	TH11-511	TH11-511	TH11-511	TH11-511
DEPTH (feet)		35.0-39.0	39.0-44.0	67.0-74.0	11.0-19.0	19.0-24.0	39.0-44.0	54.0-59.0
LATITUDE		N66.92049°	N66.92049°	N66.92049°	N66.91977°	N66.91977°	N66.91977°	N66.91977°
LONGITUDE		W162.28829°	W162.28829°	W162.28829°	W162.28881°	W162.28881°	W162.28881°	W162.28881°
LAB NUMBER		**11-3016**	**11-3017**	**11-3018**	**11-3020**	**11-3021**	**11-3022**	**11-3023**
DATE SAMPLED		12-Mar-11	12-Mar-11	12-Mar-11	14-Mar-11	14-Mar-11	14-Mar-11	14-Mar-11
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**	98	96	98	100	97	99	100
	0.75"	95	85	95	98	96	97	97
	0.5"	83	66	88	91	86	88	87
	0.375"	71	53	83	84	78	81	81
	#4	52	29	67	61	55	62	62
	#8							
	#10	44.2	18.5	57.2	48.0	38.3	46.3	45.0
	#16							
	#20	42.1	15.5	48.6	40.5	29.5	37.5	33.3
Sand	**#40**	41.1	13.8	41.9	35.6	24.7	31.4	27.4
	#50							
	#60							
	#80							
	#100	39.2	11.6	33.5	26.6	18.8	24.4	20.8
Silt/Clay	**#200**	35.4	10.1	28.6	20.3	15.4	20.4	17.5
Hydro	**0.02**							
	0.005							
	0.002							
	0.001							
LIQUID LIMIT		NV			NV	NV	NV	NV
PLASTIC INDEX		NP			NP	NP	NP	NP
USCS CLASSIFICATION		GM			SM	GM	SM	SM
USCS SOIL DESCRIPTION			(PGGr w/Sa)	(SiSa w/Gr)				
NATURAL MOISTURE		27.0			12.9	6.4		
ORGANICS		9.8			0.8	0.7		
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION							27	
DEGRAD. FACTOR							46	
SODIUM SULF. (CRSE)					0			
SODIUM SULF. (FINE)					0			
NORDIC ABRASION								
REMARKS		Org[1]						

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER:
AKSAS NUMBER: 76884
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: IGGY HILL

TEST HOLE NUMBER		TH11-511	TH11-513	TH11-513				
DEPTH (feet)		69.0-74.0	5.0-6.0	10.0-15.0				
LATITUDE		N66.91977°	N66.91877°	N66.91877°				
LONGITUDE		W162.28881°	W162.28958°	W162.28958°				
LAB NUMBER		**11-3024**	**11-3025**	**11-3026**				
DATE SAMPLED		14-Mar-11	15-Mar-11	15-Mar-11				
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**	99		99				
	0.75"	95		97				
	0.5"	85		92				
	0.375"	79		85				
	#4	52		62				
	#8							
	#10	39.8		48.3				
	#16							
	#20	32.4		41.1				
Sand	**#40**	26.7		36.7				
	#50							
	#60							
	#80							
	#100	19.9		28.2				
Silt/Clay	**#200**	16.6		22.0				
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT		NV		NV				
PLASTIC INDEX		NP		NP				
USCS CLASSIFICATION		GM		SM				
USCS SOIL DESCRIPTION			(Si)					
NATURAL MOISTURE		6.4	24.4					
ORGANICS		0.7						
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
NORDIC ABRASION								
REMARKS								

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

MOISTURE DENSITY TEST DATA

11/1/2011

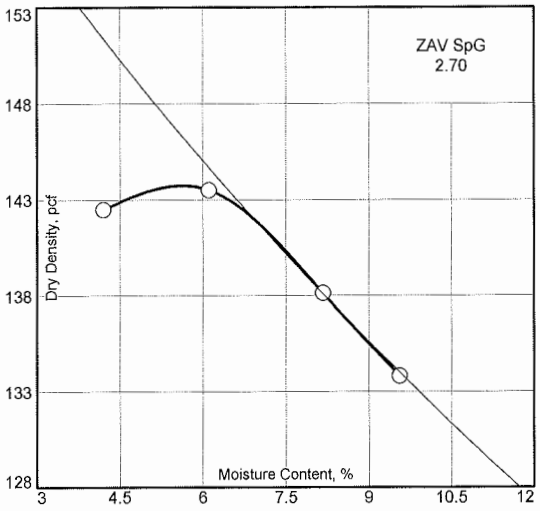
Client: State of Alaska DOT, Materials Section
Project: Kotzebue to Cape Blossom Road/Iggy Hill Material Site
Project Number: 2011-027
Location: TB 11-506
Sample Number: 11-3012 & 3013
Description: silty gravel with sand
USCS Classification: GM **AASHTO Classification:** A-1-b
Liquid Limit: NV **Plasticity Index:** NP
Tested by: Amy Steiner, NR# 705 **Checked by:** JIm Mack, Supervisor

Test Data and Results

Test Specification:

Type of Test: AASHTO T 180-01 Method D Modified

Mold Dia: 6.00 **Hammer Wt.:** 10 lb. **Drop:** 18 in. **Layers:** five **Blows per Layer:** 56



Point No.	1	2	3	4
Wt. M+S	10437.3	10501.6	10631.4	10533.8
Wt. M	5450.6	5450.6	5450.6	5450.6
Wt. W+T	5748.6	5997.5	5944.4	5848.1
Wt. D+T	5316.1	5794.1	5646.4	5464.9
Tare	786.2	950.0	768.6	775.4
Moist.	9.5	4.2	6.1	8.2
Dry Den.	133.8	142.5	143.5	138.1

Rock Corrected Results: **Max. Dry Den.=** 145 pcf **Opt. Moist.=** 5%
Uncorrected Results: **Max. Dry Den.=** 144 pcf **Opt. Moist.=** 6%

Rock Correction Data:

Correction Method: AASHTO T 224-01

Percentage of Oversize Material (%> 3/4 in.): 5.0 **Bulk Specific Gravity of Oversize Material:** 2.65

Oversize Material Moisture Content: 0.8

Note: the rock correction was applied to the calculated max. density and opt. moisture values.

MOISTURE DENSITY TEST DATA

11/1/2011

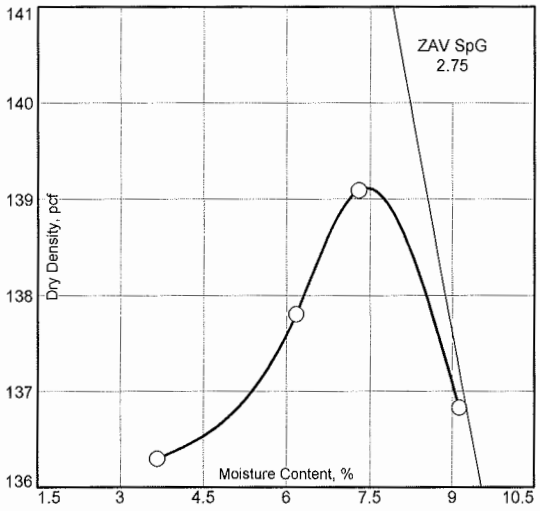
Client: State of Alaska DOT, Materials Section
Project: Kotzebue to Cape Blossom Road/Iggy Hill Material Site
Project Number: 2011-027
Location: tb 11-508
Depth: 35-39 FT **Sample Number:** 11-3016
Description: silty gravel with sand
USCS Classification: GM **AASHTO Classification:** A-2-4(0)
Liquid Limit: NV **Plasticity Index:** NP
Testing Remarks: Sa# 3016 & 3017 Combined for Proctor
Tested by: Amy Steiner NR # 705 **Checked by:** Jim Mack, Supervisor

Test Data and Results

Test Specification:

Type of Test: AASHTO T 180-01 Method D Modified

Mold Dia: 6.00 **Hammer Wt.:** 10 lb. **Drop:** 18 in. **Layers:** five **Blows per Layer:** 56



Point No.	1	2	3	4
Wt. M+S	10257.6	10428.1	10527.7	10530.4
Wt. M	5450.6	5450.6	5450.6	5450.6
Wt. W+T	5482.1	5699.6	6027.3	6005.1
Wt. D+T	5311.9	5417.9	5682.6	5581.0
Tare	677.4	855.5	958.2	935.0
Moist.	3.7	6.2	7.3	9.1
Dry Den.	136.3	137.8	139.1	136.8

Rock Corrected Results: **Max. Dry Den.=** 140 pcf **Opt. Moist.=** 7%
Uncorrected Results: **Max. Dry Den.=** 139 pcf **Opt. Moist.=** 7%

Rock Correction Data:

Correction Method: AASHTO T 224-01

Percentage of Oversize Material (%> 3/4 in.): 5.1 **Bulk Specific Gravity of Oversize Material:** 2.65

Oversize Material Moisture Content: .8

Note: the rock correction was applied to the calculated max. density and opt. moisture values.

APPENDIX C

CAPE BLOSSOM DRILL LOGS

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1507
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/3/2010 - 4/3/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.7289°, W162.43659°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Depth (ft)	Sample Method	Sample Number	Blow Count	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
0							ICE
4							WATER
9	SPT	10-4030	1, 2, 2, 4				Bn Poorly-graded SAND Fine sand
10							Bk-Bn SILT moist, loose, *Org* SAMPLE 10-4030 (9.5-10.5): NM 35.3%, ORG 3.6%
16	SPT	10-4031	2, 3, 5, 6	8			SAMPLE 10-4031 (16.0-17.0): NM 41.9%, ORG 6.0%
21	SPT	10-4032	1, 2, 3, 3	5			SAMPLE 10-4032 (21.0-22.0): ML, 92.3% -200, NM 41.2%, ORG 7.4%, NV, NP
26	SPT	10-4033	1, 3, 2, 4	5			SAMPLE 10-4033 (26.0-27.0): NM 37.6%, ORG 3.8%
31	SPT	10-4034	2, 3, 4, 6	7			SAMPLE 10-4034 (31.0-32.0): NM 32.8%, ORG 4.5%
32							BOH

Drilling Method: H-S Auger

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1508
Total Depth: 32 feet
Dates Drilled: 4/4/2010 - 4/4/2010
Station, Offset:
Latitude, Longitude: N66.72755°, W162.43739°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0									ICE
	4									WATER
	13		SPT	10-4035	3, 3, 3, 4					Bn Silty SAND loose, *sl Org* SAMPLE 10-4035 (13.0-14.0): SM, 30.9% -200, ORG 1.4%, NV, NP
	14									Bk-Bn SILT moist, loose, *sl Org*, Shell fragments, darker organic-rich bands, some high organic
	20		SPT	10-4036	2, 2, 4, 4		6			SAMPLE 10-4036 (20.0-22.0):
	25				2, 3, 5, 6		8			
	30		SPT	10-4037	2, 2, 3, 3		5			SAMPLE 10-4037 (30.0-31.5): NM 8.1%, ORG 3.3%
	32									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1509
Total Depth: 32 feet
Dates Drilled: 4/4/2010 - 4/4/2010
Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Station, Offset:
Weather:
Latitude, Longitude: N66.7249°, W162.43875°
TH Finalized By: K. Maxwell
Vegetation:
Elevation:

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log
H-S Auger	0–32		SPT	10-4038	4, 3, 3, 6		6		
			SPT	10-4039					
			SPT	10-4040	2, 3, 6, 9		9		
					2, 3, 3, 5		6		

SUBSURFACE MATERIAL

0 ICE

4 WATER

18 Bn Poorly-graded SAND
w/ Silt & Gravel
sl Org

SAMPLE 10-4038 (20.0-21.0): ORG 1.6%

21 Bk-Bn Sandy SILT
moist, *Org*

SAMPLE 10-4039 (21.0-22.0): NM 52.6%, ORG 11.6%

SAMPLE 10-4040 (25.0-27.0): ML, 70% -200, ORG 13.9%, NV, NP

32 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1510
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/4/2010 - 4/4/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.7222°, W162.4401°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0									ICE
	4									WATER
	22				1 2 5 5		7			Bn Poorly-graded SAND w/ Silt & Gravel SHELL FRAGMENTS
	25		SPT	10-4041	1 3 3 4		6			Bk-Bn SILT moist, loose, *sl Org*, SHELL FRAGMENTS SAMPLE 10-4041 (25.0-27.0): NM 38.3%, ORG 3.7%
	30				3 4 6 8		10			
	32									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1511
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/4/2010 - 4/4/2010
Field Crew	J. Cline, G. Nelson	Equipment Type	CME 45B
Station, Offset		Weather	
Latitude, Longitude	N66.71949°, W162.44148°	TH Finalized By	K. Maxwell
Elevation		Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0									ICE
	4									WATER
	24		SPT	10-4042	2, 1, 4, 4		5			Bn Silty SAND w/ Gravel
	25									Bk-Bn SILT moist, *sl Org*, SHELL FRAGMENTS SAMPLE 10-4042 (25.0-26.0): ML, 92.6% -200, NM 42.4%, ORG 4.3%, NV, NP
	30		SPT		2, 3, 4, 5		7			
	32									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1512
Total Depth: 32 feet
Dates Drilled: 4/4/2010 - 4/4/2010
Station, Offset:
Latitude, Longitude: N66.71689°, W162.44279°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Depth in (Feet)	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
0								ICE
4								WATER
26			1 4 4 6		8			Bk-Bn SILT moist, *sl Org*, SHELL FRAGMENTS
29	SPT	10-4043	3 5 6 6		11			Bk-Bn SILT w/ Sand moist, *sl Org*, SHELL FRAGMENTS SAMPLE 10-4043 (30.0-32.0): ORG 2.6%
32								BOH

Drilling Method: H-S Auger

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1513
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/4/2010 - 4/4/2010
Field Crew	J. Cline, G. Nelson	Equipment Type	CME 45B
Station, Offset		Weather	
Latitude, Longitude	N66.71634°, W162.43598°	TH Finalized By	K. Maxwell
Elevation		Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0									ICE
	4									WATER
	27									Bk-Gy Poorly-graded SAND w/ Silt *sl Org*, SHELL FRAGMENTS
	30		SPT	10-4044	3 3 5 6		8			SAMPLE 10-4044 (30.0-32.0): SP-SM, 7.2% -200, ORG 0.8%, NV, NP
	32									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1514
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/5/2010 - 4/5/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.719°, W162.43466°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0									ICE
	5									WATER
	25				3 4 5 6		9			Bn Poorly-graded GRAVEL w/ Sand 1.5" MINUS
	27									Bk-Bn SILT moist to wet, *sl Org*
	28									Bk-Bn Silty SAND *sl Org*, LAYERS OF SILT W/SAND
	30		SPT	10-4045	2 4 4 5		8			SAMPLE 10-4045 (30.0-32.0): SM, 36.6% -200, ORG 3.3%, NV, NP
	32									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1515
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/5/2010 - 4/5/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72166°, W162.43326°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
H-S Auger	0									ICE
	4									WATER
	21		SPT	10-4046	1 3 4 5					Bn SILT w/ Sand loose
	22									SAMPLE 10-4046 (21.5-22.5): ML, 71.1% -200, NV, NP
	23									Bk-Bn SILT moist, loose, *sl Org*
	25				2 2 4 4		6			
	30				4 6					Bn Poorly-graded SAND w/ Silt *sl Org*
	31		SPT	10-4047	8 9		14			BOH Bk-Bn SILT moist, loose, *sl Org*, sHELL FRAGMENTS
	32									SAMPLE 10-4047 (31.0-32.0): NM 28.2%, ORG 3.7%

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1516
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/5/2010 - 4/5/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72434°, W162.4319°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log
H-S Auger	0–17								
	18				2				
	19				1 1				
	20				3				
	21–25								
	26				1 2 1 4		3		
	27–29								
	30		SPT	10-4048	2				
	31				3 4				
	32				5				

SUBSURFACE MATERIAL

0 ICE

4 WATER

18 Bn Silty SAND
w/ Gravel
loose

19 Bk-Bn SILT
moist, loose, *sl Org*

30 Bn Silty SAND
w/ Gravel
moist, loose, *sl Org*

BOH

SAMPLE 10-4048 (30.0-31.0): NM 26.4%, ORG 2.4%

Bk-Bn SILT
moist, loose, *sl Org*, TRACE SAND OR POSS FINE GRAVEL

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1517
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/6/2010 - 4/6/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72702°, W162.43057°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Depth in (Feet)	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
0								ICE
4								WATER
13			1, 1, 1, 3					Bn Poorly-graded SAND loose
14								Bk -Bn SILT moist, loose, *sl Org*
20	SPT	10-4049	1, 2, 2, 3		4			SAMPLE 10-4049 (20.0-22.0): ORG 3.1%, NV, NP
24								Bk-Bn Silty SAND wet, loose, *sl Org*
25	SPT	10-4050	WOR, WOR, 5, 8					SAMPLE 10-4050 (25.0-27.0): SM, 19.7% -200, NM 24.7%, ORG 0.9%, NV, NP
30			3, 7, 8, 9					
31								Bk -Bn Sandy Silt
32							BOH	moist to wet, *sl Org*

Drilling Method: H-S Auger

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1518
Total Depth: 32 feet
Dates Drilled: 4/6/2010 - 4/6/2010
Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Station, Offset:
Weather:
Latitude, Longitude: N66.72847°, W162.42984°
TH Finalized By: K. Maxwell
Vegetation:
Elevation:

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Depth (ft)	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
0								ICE
4								WATER
9			1, 3, 5, 3		8			Bn Silty SAND wet, loose, TRACE GRAVEL
14								Poorly-graded GRAVEL w/ Silt & Sand wet
15	SPT	10-4051	1, 4, 5, 6					Bn Silty SAND w/ Gravel wet
16								Bk -Bn PEAT wet
17								Bk-Bn SILT moist, very loose, *sl Org* SAMPLE 10-4051 (16.0-17.0): NM 37.6%
20			WOR, 1, 2, 2					
24								Bk-Bn Silty SAND wet, very loose, *sl Org* SAMPLE 10-4052 (25.0-27.0): SM, 33.9% -200, NV, NP
25	SPT	10-4052	WOR, WOR, 1, 2					
28								Bk-Bn SILT moist, loose, *sl Org*
30			2, 4, 6, 7		10			
32								BOH

Drilling Method: H-S Auger

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1519
Project Number	AKSAS 76884	Total Depth	32 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/6/2010 - 4/6/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72865°, W162.43324°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Depth (ft)	Sample Method	Sample Number	Blow Count	N-Value	Graphic Log	SUBSURFACE MATERIAL
0						ICE
4						WATER
9			3			Bn Poorly-graded SAND wet
10			2 3 4			Bk-Bn SILT moist, loose, *sl Org*, MINOR FINE SAND, THIN FIBROUS ORGANIC LAYERS
15			2			
16			2 3	5		
17			3			
18						Bn Poorly-graded SAND wet
19						Bk-Bn SILT moist, very loose, *sl Org*
20			WOR			
21			1 2 3	3		
23						Bn Poorly-graded SAND wet, loose, *sl Org*
25	SPT	10-4053	WOR			SAMPLE 10-4053 (25.0-27.0): ORG 1.4%
26			2 5 8	7		
30			3			
31			7 9 12			Bk-Bn SILT
32					BOH	moist, loose, *sl Org*

Drilling Method: H-S Auger

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☒ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1520
Total Depth: 22 feet
Dates Drilled: 4/8/2010 - 4/8/2010
Station, Offset:
Latitude, Longitude: N66.7274°, W162.42142°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0									ICE
	1–4									ICE
	5									WATER
	6–9									
	9–22									Bk-Bn SILT w/ Sand moist, loose, *sl Org*, GRAVEL FRAGMENT AT 22'
	22									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1521
Project Number	AKSAS 76884	Total Depth	25 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72453°, W162.4222°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Casing Blows / ft

Frozen | Graphic Log

SUBSURFACE MATERIAL

Depth (ft)	Description
0	ICE
4	WATER
15	Bk-Bn SILT w/ Sand moist, loose, *sl Org*
25	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1522
Project Number	AKSAS 76884	Total Depth	28 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Equipment Type	CME 45B
Station, Offset		Weather	
Latitude, Longitude	N66.72724°, W162.45911°	TH Finalized By	K. Maxwell
Vegetation		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0–4									ICE
	4–13									WATER
	13–22									Bk-Bn SILT w/ Sand moist, loose, *sl Org*, GRAVEL PARTICLES AT 21 & 22'
	22–28									Bk-Bn Sandy Silt moist, loose, *sl Org*
	28									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1523
Total Depth: 34 feet
Dates Drilled: 4/8/2010 - 4/8/2010
Station, Offset:
Latitude, Longitude: N66.7218°, W162.46197°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Casing Blows / ft

Frozen | Graphic Log

SUBSURFACE MATERIAL

0 ICE

4 WATER

21 Bk-Bn SILT
w/ Sand
moist, loose, *sl Org*

34 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS_OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1524
Total Depth: 34 feet
Dates Drilled: 4/8/2010 - 4/8/2010
Station, Offset:
Latitude, Longitude: N66.71698°, W162.4715°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Casing Blows / ft.

Frozen | Graphic Log

SUBSURFACE MATERIAL

0 ICE

4 WATER

27 Bn Poorly-graded SAND

28 Bk-Bn SILT
w/ Sand
moist, loose, *sl Org*

34 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1525
Total Depth: 34 feet
Dates Drilled: 4/8/2010 - 4/8/2010
Station, Offset:
Latitude, Longitude: N66.7197°, W162.47009°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0									ICE
	4									WATER
	24									Bk-Bn SILT w/ Sand moist, loose, *sl Org*
	34									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1526
Project Number	AKSAS 76884	Total Depth	34 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72499°, W162.4674°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 10-4054; Blow Count; Sample Interval; N-Value

Casing Blows / ft; Frozen; Graphic Log

SUBSURFACE MATERIAL

0 ICE

4 WATER

18 Poorly-graded SAND
w/ Gravel
loose

21 Bk-Bn SILT
w/ Sand
loose, *sl Org*, TRACE GRAVEL AT 28'

30 SAMPLE 10-4054 (30.0-34.0): ML, 83.3% -200, ORG 3.2%, NV, NP

34 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project: Kotzebue to Cape Blossom Road
Project Number: AKSAS 76884
Test Hole Number: 10-1527
Total Depth: 34 feet
Dates Drilled: 4/8/2010 - 4/8/2010
Station, Offset:
Latitude, Longitude: N66.72908°, W162.46546°
Elevation:

Field Geologist: S. MASTERMAN
Field Crew: J. Cline, G. Nelson
Equipment Type: CME 45B
Weather:
Vegetation:
TH Finalized By: K. Maxwell

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data: Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	SUBSURFACE MATERIAL
S-S Auger	0–4									ICE
	4–10									WATER
	10–21									Bk-Bn SILT w/ Sand *sl Org*
	21–34									Bk-Bn Poorly-graded SAND w/ Gravel
	34									BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/15/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1528
Project Number	AKSAS 76884	Total Depth	34 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Equipment Type	CME 45B
Station, Offset		Weather	
Latitude, Longitude	N66.72851°, W162.45857°	Vegetation	
TH Finalized By	K. Maxwell	Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Casing Blows / ft

Frozen | Graphic Log

Depth (ft)	SUBSURFACE MATERIAL
0	ICE
4	WATER
10	Bk-Bn Sandy SILT *sl Org*
19	Bk-Bn SILT *sl Org*
34	BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1529
Project Number	AKSAS 76884	Total Depth	34 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72772°, W162.46635°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value

Casing Blows / ft | Frozen | Graphic Log

SUBSURFACE MATERIAL

0 ICE

4 WATER

13 Bk-Bn SILT
w/ Sand
sl Org

20 Bk-Bn Sandy SILT
w/ Gravel
sl Org, TILL?

24 Bk-Bn SILT
w/ Sand
sl Org, OCC. GRAVEL, TILL?

34 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1530
Project Number	AKSAS 76884	Total Depth	34 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Station, Offset	
Equipment Type	CME 45B	Latitude, Longitude	N66.72922°, W162.47271°
Weather		Elevation	
TH Finalized By	K. Maxwell	Vegetation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Sample Data: Method | Number | Blow Count | Sample Interval | N-Value | Casing Blows / ft | Frozen | Graphic Log

Depth (ft)	SUBSURFACE MATERIAL
0	ICE
4	WATER
7	Bn Poorly-graded SAND w/ Gravel
10	Bk-Bn SILT w/ Sand *sl Org*
13	Bk-Bn Sandy SILT w/ Gravel *sl Org*, TILL?
15	Bk-Bn SILT w/ Sand *sl Org*
22	Bk-Bn Sandy SILT w/ Gravel *sl Org*, TILL?
26	Bk-Bn SILT w/ Sand *sl Org*
34	BOH

Drilling Method: S-S Auger

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

FINAL TEST HOLE LOG

STATE OF ALASKA DOT/PF
Northern Region Materials
Geology Section

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1531
Project Number	AKSAS 76884	Total Depth	34 feet
Field Geologist	S. MASTERMAN	Dates Drilled	4/8/2010 - 4/8/2010
Field Crew	J. Cline, G. Nelson	Equipment Type	CME 45B
		Station, Offset	
		Weather	
		Latitude, Longitude	N66.72864°, W162.47807°
TH Finalized By	K. Maxwell	Vegetation	
		Elevation	

Ground Water Data	While Drilling	After Drilling
Depth in (ft.)	0.5	
Time		
Date		
Symbol	▼	

GENERAL COMMENTS:

Drilling Method: S-S Auger

Sample Data: Method: AUGER; Number: 10-4055; Blow Count; Sample Interval; N-Value; Casing Blows / ft

Frozen; Graphic Log

SUBSURFACE MATERIAL

0 ICE

5 WATER

8 Bk-Bn SILT
w/ Sand
sl Org

SAMPLE 10-4055 (10.0-15.0): ML, 79.5% -200, ORG 3.4%, LL 40, PI 13

34 BOH

Note: Unless otherwise noted, all samples are taken with 1-3/8-in. ID Standard Penetration Sampler driven with 140 lb. hammer with 30-in. drop. ☐ CME Auto Hammer ☐ Cathead Rope Method

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR_AKDOT_PRECON_USCS_06_28_07.GDT 11/2/11

APPENDIX D

CAPE BLOSSOM LAB RESULTS

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER: 76884
AKSAS NUMBER:
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: CAPE BLOSSOM

TEST HOLE NUMBER		10-1507	10-1507	10-1507	10-1507	10-1507	10-1508	10-1508
DEPTH (feet)		9.5-10.5	16.0-17.0	21.0-22.0	26.0-27.0	31.0-32.0	13.0-14.0	20.0-22.0
LATITUDE		N66.7289°	N66.7289°	N66.7289°	N66.7289°	N66.7289°	N66.72755°	N66.72755°
LONGITUDE		W162.43659°	W162.43659°	W162.43659°	W162.43659°	W162.43659°	W162.43739°	W162.43739°
LAB NUMBER		**10-4030**	**10-4031**	**10-4032**	**10-4033**	**10-4034**	**10-4035**	**10-4036**
DATE SAMPLED		3-Apr-10	3-Apr-10	3-Apr-10	3-Apr-10	3-Apr-10	4-Apr-10	4-Apr-10
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8			100			100	
	#10			99			99	
	#16			99			99	
Sand	**#30**			98			99	
	#40			97			97	
	#50			96			93	
	#60							
	#80							
	#100							
Silt/Clay	**#200**			92.3			30.9	
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT				NV			NV	
PLASTIC INDEX				NP			NP	
USCS CLASSIFICATION				ML			SM	
USCS SOIL DESCRIPTION		(Si)	(Si)	(Si)	(Si)	(Si)	(SiSa)	(Si)
NATURAL MOISTURE		35.3	41.9	41.2	37.6	32.8		
ORGANICS		3.6	6.0	7.4	3.8	4.5	1.4	
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
NORDIC ABRASION								
REMARKS		sl Org[1]	Org[1]	Org[1]	sl Org[1]	sl Org[1]		

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER: 76884
AKSAS NUMBER:
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: CAPE BLOSSOM

TEST HOLE NUMBER		10-1508	10-1509	10-1509	10-1509	10-1510	10-1511	10-1512
DEPTH (feet)		30.0-31.5	20.0-21.0	21.0-22.0	25.0-27.0	25.0-27.0	25.0-26.0	30.0-32.0
LATITUDE		N66.72755°	N66.7249°	N66.7249°	N66.7249°	N66.7222°	N66.71949°	N66.71689°
LONGITUDE		W162.43739°	W162.43875°	W162.43875°	W162.43875°	W162.4401°	W162.44148°	W162.44279°
LAB NUMBER		**10-4037**	**10-4038**	**10-4039**	**10-4040**	**10-4041**	**10-4042**	**10-4043**
DATE SAMPLED		4-Apr-10	4-Apr-10	4-Apr-10	4-Apr-10	4-Apr-10	4-Apr-10	4-Apr-10
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8				100			
	#10				99			
	#16				91			
	#30				88			
Sand	**#40**				84			
	#50				83			
	#60				79			
	#80				78			
	#100							
Silt/Clay	**#200**				70.0		92.6	
	0.02							
Hydro	**0.005**							
	0.002							
	0.001							
LIQUID LIMIT					NV		NV	
PLASTIC INDEX					NP		NP	
USCS CLASSIFICATION					ML		ML	
USCS SOIL DESCRIPTION		(Si)	(WGSa w/Si&Gr)	(Si)	(Si)	(Si)		(Si w/Sa)
NATURAL MOISTURE		8.1		52.6		38.3	42.4	
ORGANICS		3.3	1.6	11.6	13.9	3.7	4.3	2.6
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
NORDIC ABRASION								
REMARKS		sl Org[1]		Org[1]	Org[1]	sl Org[1]	sl Org[1]	sl Org[1]

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME: Kotzebue to Cape Blossom Road
PROJECT NUMBER: 76884
AKSAS NUMBER:
SAMPLED BY: K. MAXWELL
MATERIAL SOURCE: CAPE BLOSSOM

TEST HOLE NUMBER		10-1513	10-1514	10-1515	10-1515	10-1516	10-1517	10-1517
DEPTH (feet)		30.0-32.0	30.0-32.0	21.5-22.5	31.0-32.0	30.0-31.0	20.0-22.0	25.0-27.0
LATITUDE		N66.71634°	N66.719°	N66.72166°	N66.72166°	N66.72434°	N66.72702°	N66.72702°
LONGITUDE		W162.43598°	W162.43466°	W162.43326°	W162.43326°	W162.4319°	W162.43057°	W162.43057°
LAB NUMBER		**10-4044**	**10-4045**	**10-4046**	**10-4047**	**10-4048**	**10-4049**	**10-4050**
DATE SAMPLED		4-Apr-10	5-Apr-10	5-Apr-10	5-Apr-10	5-Apr-10	6-Apr-10	6-Apr-10
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"		100					
	0.5"		99					
	0.375"		97	100				
	#4	100	95	99				
	#8	97	92	97				
	#10	97	92	97				
	#16	96	90	96				
	#30	95	85	94				100
Sand	**#40**	92	82	93				99
	#50	83	77	92				98
	#60	74	74	91				96
	#80	46	68	88				83
	#100	34	63	86				69
Silt/Clay	**#200**	7.2	36.6	71.1				19.7
	0.02						42.0	
Hydro	**0.005**						11.1	
	0.002						7.0	
	0.001						6.3	
LIQUID LIMIT		NV	NV	NV			NV	NV
PLASTIC INDEX		NP	NP	NP			NP	NP
USCS CLASSIFICATION		SP-SM	SM	ML				SM
USCS SOIL DESCRIPTION		(PGSa w/Si)	(SiSa)	(WGSa w/Si)	(Si)	(SiSa w/Gr)	(Si)	(SiSa)
NATURAL MOISTURE					28.2	26.4		24.7
ORGANICS		0.8	3.3		3.7	2.4	3.1	0.9
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
NORDIC ABRASION								
REMARKS			sl Org[1]		sl Org[1]	sl Org[1]	sl Org[1]	

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION
NORTHERN REGION
LABORATORY TESTING REPORT

PROJECT NAME:	Kotzebue to Cape Blossom Road
PROJECT NUMBER:	76884
AKSAS NUMBER:	
SAMPLED BY:	K. MAXWELL
MATERIAL SOURCE:	CAPE BLOSSOM

TEST HOLE NUMBER		10-1518	10-1518	10-1519	10-1526	10-1531		
DEPTH (feet)		16.0-17.0	25.0-27.0	25.0-27.0	30.0-34.0	10.0-15.0		
LATITUDE		N66.72847°	N66.72847°	N66.72865°	N66.72499°	N66.72864°		
LONGITUDE		W162.42984°	W162.42984°	W162.43324°	W162.4674°	W162.47807°		
LAB NUMBER		**10-4051**	**10-4052**	**10-4053**	**10-4054**	**10-4055**		
DATE SAMPLED		6-Apr-10	6-Apr-10	6-Apr-10	8-Apr-10	8-Apr-10		
% Passing	**3"**							
	2"							
	1.5"							
Gravel	**1.0"**							
	0.75"							
	0.5"							
	0.375"							
	#4							
	#8							
	#10							
	#16				100	100		
	#30		100		99	99		
Sand	**#40**		99		98	99		
	#50		99		96	96		
	#60		98		95	95		
	#80		90		93	91		
	#100		77		91	89		
Silt/Clay	**#200**		33.9		83.3	79.5		
	0.02				51.2			
Hydro	**0.005**				25.9			
	0.002				15.3			
	0.001				12.2			
LIQUID LIMIT			NV		NV	40		
PLASTIC INDEX			NP		NP	13		
USCS CLASSIFICATION			SM		ML	ML		
USCS SOIL DESCRIPTION		(Si)		(PGSa)	(Si w/Sa)	(Si w/Sa)		
NATURAL MOISTURE		37.6						
ORGANICS				1.4	3.2	3.4		
SP. GR. (FINE)								
SP. GR. (COARSE)								
MAX. DRY DENSITY								
OPTIMUM MOISTURE								
L.A. ABRASION								
DEGRAD. FACTOR								
SODIUM SULF. (CRSE)								
SODIUM SULF. (FINE)								
NORDIC ABRASION								
REMARKS					sl Org[1]	sl Org[1]		

GENERAL COMMENTS

Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7.

[1] Organic content determination is based on the results of the ATM T-6 test method.

(Soil descriptions shown in parentheses are based on field determinations.)

USCS Soil Description Abbreviations: WG = Well-graded; PG = Poorly-graded; E = Elastic; L = Lean; F = Fat

APPENDIX E

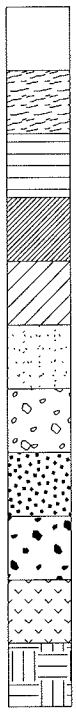
SYMBOLS AND DEFINITIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

FROZEN SOIL CLASSIFICATION SYSTEM

SYMBOLS AND DEFINITIONS

BASIC MATERIAL SYMBOLS



ASPHALT

PEAT

CLAY (Cl)

ICE

SILT (Si)

POORLY GRADED SAND (Sa)

POORLY GRADED GRAVEL (Gr)

WELL GRADED SAND

WELL GRADED GRAVEL

BEDROCK (Bx), soft(Type)

BEDROCK (Bx), hard(Type)

SOFT OR HARD BEDROCK BASED ON DRILLING RATE

NOTE

MAIN COMPONENT (UPPER CASE ... SOLID LINES)
MINOR COMPONENT (Title Case ... DASHED LINES OR SPARSER PATTERN)

USCS SIZE DEFINITIONS

BOULDERS (Boulders)	12"+
COBBLES (Cobbles)	3" TO 12"
GRAVEL	#4 TO 3"
ANGULAR FRAGMENTS	#10 +
SAND	#200 TO #4
SILT	#200 TO 0.005 mm
CLAY	MINUS 0.005 mm

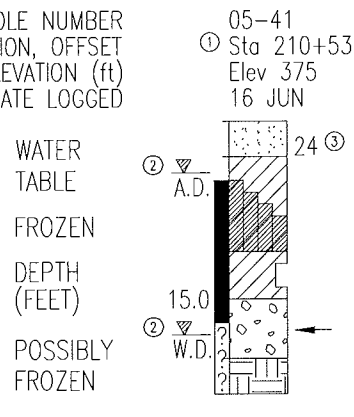
TEST RESULTS

_._%-200	= % PASSING #200 SIEVE
NM _._%	= NATURAL MOISTURE
ORG _._%	= ORGANIC CONTENT
SSc _	= SODIUM SULFATE LOSS(coarse)
SSf _	= SODIUM SULFATE LOSS(fine)
LA _	= LOS ANGELES ABRASION
DEG _	= DEGRADATION
LL _	= LIQUID LIMIT (NV = no value)
PI _	= PLASTIC INDEX (NP = non-plastic)

MISC.

Tr	= TRACE
sl	= SLIGHTLY
hi	= HIGHLY
w/_	= WITH UNSPECIFIED AMOUNT
X'tls	= CRYSTALS
TH	= TEST HOLE
TT	= TEST TRENCH
TP	= TEST PIT

TYPICAL LOG

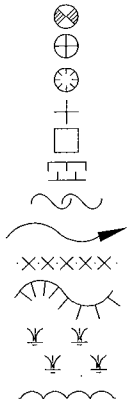


① Station value may also be on centerline e.g. Sta 210+53, CL or lat-long format e.g. N64.56789°, W145.67890°

② W.D.= WHILE DRILLING, A.D.= AFTER DRILLING

③ "N VALUE" INDICATES STANDARD PENETRATION TEST (1.4" I.D., 2.0" O.D. SAMPLER DRIVEN WITH 140 LB. HAMMER, 30" FREE FALL) AND IS SUM OF 2nd AND 3rd 6" OF PENETRATION.

PLAN VIEW SYMBOLS



POWER AUGER TEST HOLE (TH)

HAND AUGER TEST HOLE (TH)

EXPOSED MATERIAL

PROBE

HAND DUG TEST PIT (TP)

DOZER/BACKHOE TEST TRENCH (TT)

BODY OF WATER

FLOW DIRECTION

WASTE BERM

BANK

SWAMP

TREELINE

SOIL DENSITY/CONSISTENCY DESCRIPTORS

NON-COHESIVE		COHESIVE	
RELATIVE DENSITY	BLOWS/FOOT (N) VALUE	CONSISTENCY	BLOWS/FOOT (N) VALUE
VERY LOOSE	< 4	VERY SOFT	< 2
LOOSE	5-10	SOFT	2-4
MEDIUM DENSE	11-30	FIRM	5-8
DENSE	31-50	STIFF	9-15
VERY DENSE	> 50	VERY STIFF	16-30
		HARD	> 30

COLOR

Bk = BLACK	Gy = GRAY	Tn = TAN
Bl = BLUE	Or = ORANGE	Wh = WHITE
Bn = BROWN	Rd = RED	Yw = YELLOW
Gn = GREEN		

MOISTURE

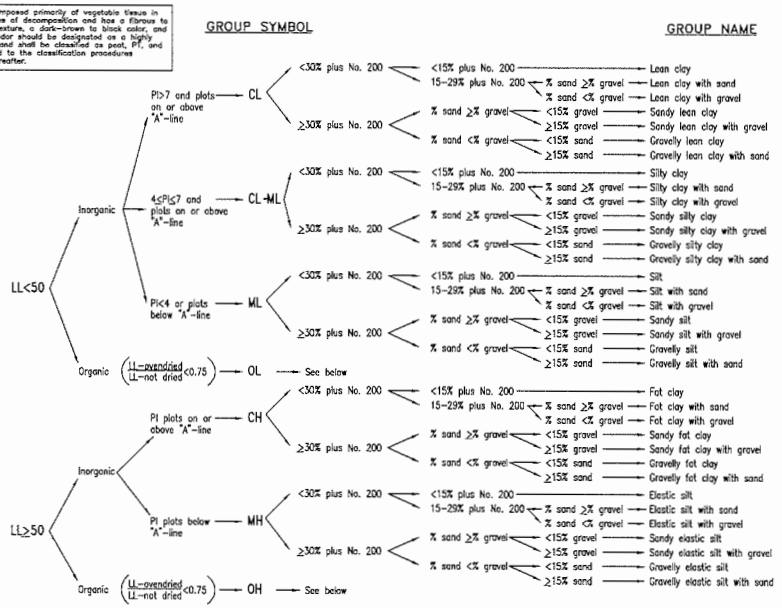
dry	= < OPTIMUM*	DUSTY, DRY TO THE TOUCH
moist	~ OPTIMUM*	DAMP, NO VISIBLE WATER
wet	= > OPTIMUM*	VISIBLE FREE WATER

* OPTIMUM MOISTURE FOR MAXIMUM DENSITY

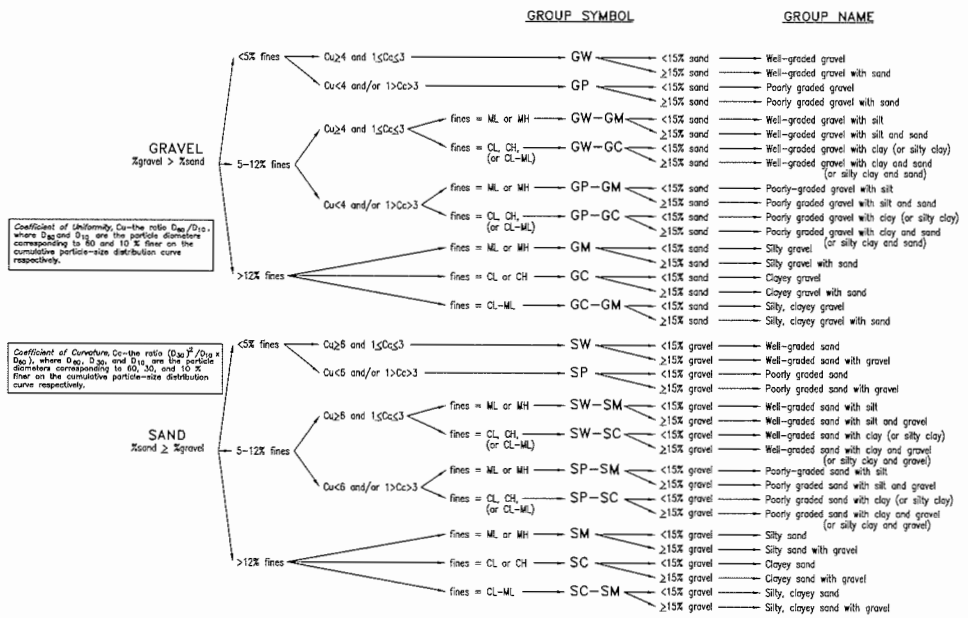
C:\Geo\SYMBOLGEOLOG-USCS-GeoLog rev 2/07

Classification of Soils for Engineering Purposes (Unified Soil Classification System)

A sample composed primarily of vegetable tissue in various stages of decomposition and has a fibrous to amorphous texture, a dark-brown to black color, and an organic odor should be designated as a highly organic soil and shall be classified as peat, PT, and not subjected to the classification procedures described hereafter.



Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)



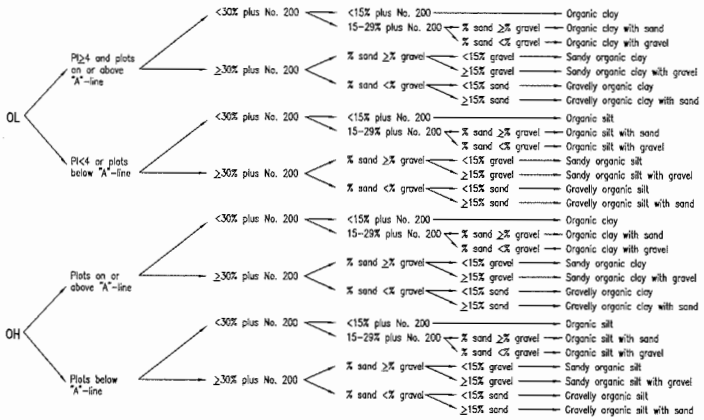
Coefficient of Uniformity, Cu-the ratio D_{60}/D_{10}, where D_{60} and D_{10} are the particle diameters corresponding to 60 and 10 % finer on the cumulative particle-size distribution curve respectively.

Coefficient of Curvature, Cc-the ratio $(D_{30})^2/(D_{10} \times D_{60})$, where D_{60}, D_{30}, and D_{10} are the particle diameters corresponding to 60, 30, and 10 % finer on the cumulative particle-size distribution curve respectively.

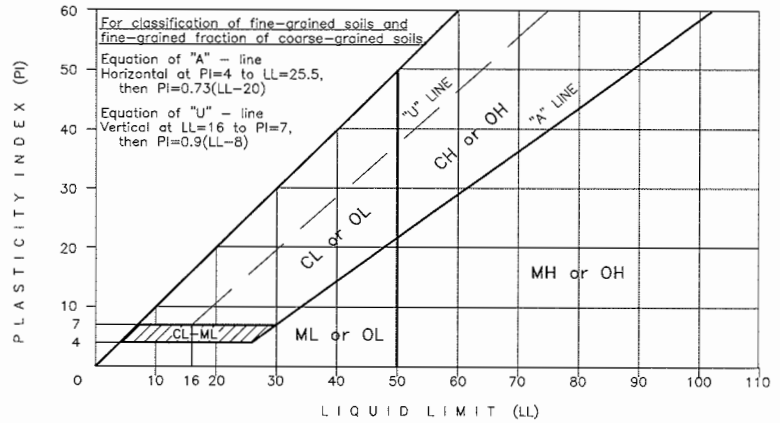
Flow Chart for Classifying Coarse-Grained Soil (More Than 50% Retained on No. 200 Sieve)

GROUP SYMBOL

GROUP NAME



Flow Chart for Classifying Organic Fine-Grained Soil (50% or More Passes No. 200 Sieve)



Plasticity Chart

DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS

Part I Description of Soil Phase (a) (Independent of Frozen State)	Major Group		Sub-Group		Field Identification (6)	Pertinent Properties of Frozen Materials which may be measured by physical tests to supplement field identification. (7)	Guide for Construction on Soils Subject to Freezing and Thawing	
	Description (2)	Designation (3)	Description (4)	Designation (5)			Thaw Characteristics (8)	Criteria (9)
Part II Description of Frozen Soil	Segregated ice is not visible by eye (b)	N	Poorly Bonded or Friable	Nf	Identify by visual examination. To determine presence of excess ice, use procedure under note (c) below and hand magnifying lens as necessary. For soils not fully saturated, estimate degree of ice saturation: Medium, Low. Note presence of crystals, or of ice coatings around larger particles.	In-Place Temperature Density and Void Ratio a) In Frozen State b) After Thawing in Place Water Content (Total H_2O, including ice) a) Average b) Distribution Strength a) Compressive b) Tensile c) Shear d) Adfreeze Elastic Properties Plastic Properties Thermal Properties Ice Crystal Structure (using optional instruments.) a) Orientation of Axes b) Crystal size c) Crystal shape d) Pattern of Arrangement	Usually Thaw-Stable	The potential intensity of ice segregation in a soil is dependent to a large degree on its void sizes and may be expressed as an empirical function of grain size as follows: Most inorganic soils containing 3 percent or more of grains finer than 0.02 mm in diameter by weight are frost-susceptible. Gravels, well-graded sands and silty sands, especially those approaching the theoretical maximum density curve, which contain 1.5 to 3 percent finer than 0.02 mm by weight without being frost-susceptible. However, their tendency to occur interbedded with other soils usually makes it impractical to consider them separately. Soils classed as frost-susceptible under the above criteria are likely to develop significant ice segregation and frost heave if frozen at normal rates with free water readily available. Soils so frozen will fall into the thaw-unstable category. However, they may also be classed as thaw-stable if frozen with insufficient water to permit ice segregation. Soils classed as non-frost-susceptible (*NFS) under the above criteria usually occur without significant ice segregation and are not exact and may be inadequate for some structure applications; exceptions may also result from minor soil variations. In permafrost areas, ice wedges, pockets, veins, or other ice bodies may be found whose mode of origin is different from that described above. Such ice may be the result of long-time surface expansion and contraction phenomena or may be glacial or other ice which has been buried under a protective earth cover.
			No excess ice Well Bonded Excess ice	Nb: n / e				
	Segregated ice is visible by eye. (Ice 1 inch or less in thickness) (b)	V	Individual ice crystals or inclusions	Vx	For ice phase, record the following as applicable: Location Size Orientation Shape Thickness Spacing Pattern of arrangement Length Hardness } Structure } per part III Below Color } Estimate volume of visible segregated ice present as percent of total sample volume		Usually Thaw-Unstable	
			Ice coatings on particles	Vc				
			Random or irregularly oriented ice formations	Vr				
			Stratified or distinctly oriented ice formations	Vs				
Part III Description of Substantial Ice Strata	Ice (Greater than 1 inch in thickness)	Ice	Ice with soil inclusions	Ice + Soil Type	Designate material as ICE (d) and use descriptive terms as follows, usually one item from each group, as applicable: Hardness: Hard; Soft (mass, not indi-crystals) Structure: Clear; Cloudy; Porous; Candled; Granular; Stratified Color: e.g.: Color-less; Gray; Blue Admixtures: e.g.: Contains Thin Silt Inclus-ions	Same as Part II above, as applicable, with special emphasis on Ice Crystal Structure.		
			Ice without soil inclusions	Ice				

DEFINITIONS:

Ice Coatings on Particles are discernible layers of ice found on or below the larger soil particles in a frozen soil mass. They are sometimes associated with hoarfrost crystals, which have grown into voids produced by the freezing action.

Ice Crystal is a very small individual ice particle visible in the face of a soil mass. Crystals may be present alone or in a combination with other ice formations.

Clear ice is transparent and contains only a moderate number of air bubbles.(e)

Cloudy Ice is translucent, but essentially sound and non-pervious

Porous Ice contains numerous voids, usually interconnected and usually resulting from melting at air bubbles or along crystal interfaces from presence of salt or other materials in the water, or from the freezing of saturated snow. Though porous, the mass retains its structural unity.

Candled ice is ice which has rotted or otherwise formed into long columnar crystals, very loosely bonded together.

Granular Ice is composed of coarse, more or less equidimensional, ice crystals weakly bonded together.

Ice Lenses are lenticular ice formations in soil occurring essentially parallel to each other, generally normal to the direction of heat loss and commonly in repeated layers.

Ice Segregation is the growth of ice as distinct lenses, layers, veins and masses in soils, commonly but not always oriented normal to direction of heat loss.

Well-bonded signifies that the soil particles are strongly held together by the ice and that the frozen soil possesses relatively high resistance to chipping or breaking.

Poorly-bonded signifies that the soil particles are weakly held together by the ice and that the frozen soil consequently has poor resistance to chipping or breaking.

Friable denotes a condition in which material is easily broken up under light to moderate pressure.

Thaw-Stable frozen soils do not, on thawing, show loss of strength below normal, long-time thawed values nor produce detrimental settlement.

Thaw-Unstable frozen soils show on thawing, significant loss of strength below normal, long-time thawed values and/or significant settlement, as a direct result of the melting of the excess ice in the soil.

Modified from: Linell, K. A. and Kaplar, C. W., 1966, *Description and Classification of Frozen Soils,* Proc. International Conference on Permafrost (1963), Lafayette, IN, U.S. National Academy of Sciences, Publ. 1287, pp 481-487.

NOTES:

(a) When rock is encountered, standard rock classification terminology should be used.

(b) Frozen soils in the N group may on close examination indicate presence of ice within the voids of the material by crystalline reflections or by a sheen on fractured or trimmed surfaces. However, the impression to the unaided eye is that none of the frozen water occupies space in excess of the original voids in the soil. The opposite is true of frozen soils in the V group.

(c) When visual methods may be inadequate, a simple field test to aid evaluation of volume of excess ice can be made by placing some frozen soil in a small jar, allowing it to melt and observing the quantity of supernatant water as a percent of total volume.

(d) Where special forms of ice, such as hoarfrost, can be distinguished, more explicit description should be given.

(e) Observer should be careful to avoid being misled by surface scratches or frost coating on the ice.