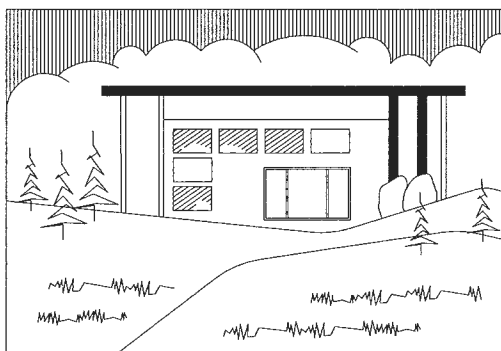
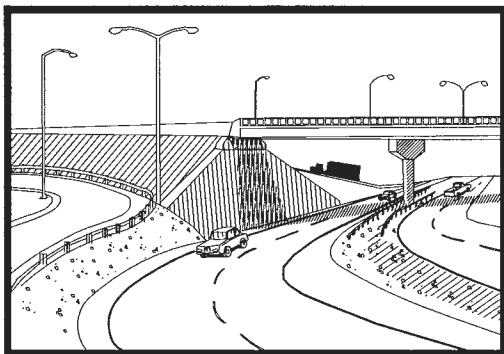
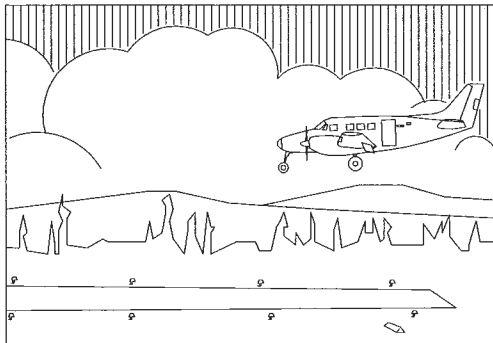


# Material Site Investigation

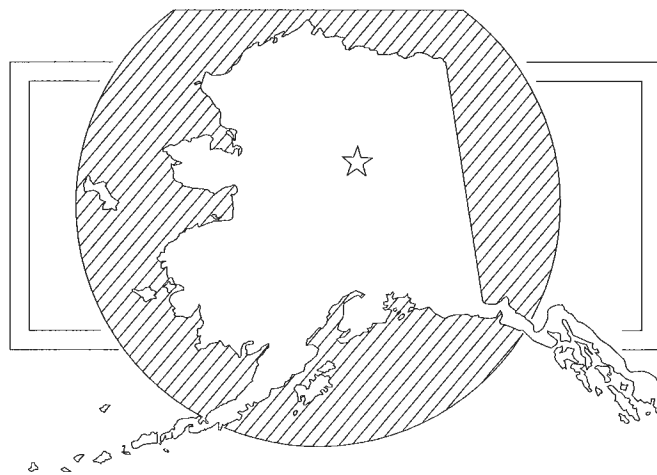
## Kotzebue to Cape Blossom Road

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**  
**October 2011**

PREPARED BY:



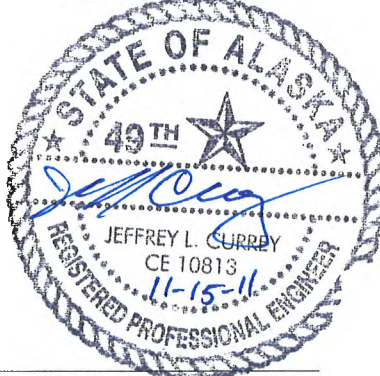
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## Contents

Material Site Location.....	1
Summary .....	2
Introduction.....	3
Expected Physical Site Conditions.....	3
Test Hole Location Map.....	4
Iggy Hill Site.....	5
Location and Access .....	5
Land Status.....	5
Clearing and Stripping .....	5
Water Table.....	5
Frozen Ground .....	5
Exploration Method .....	5
Subsurface Findings.....	6
Hill Area Material Identified .....	6
Bluff Area Material Identified .....	6
Material Characteristics .....	7
Available Material.....	8
Mining Considerations.....	8
Figure 3. Cape Blossom Test Hole Locations.....	9
Cape Blossom Offshore Drilling.....	10
Exploration Method .....	10
Subsurface Findings.....	10
References .....	11
APPENDIX A Iggy Hill Drill Logs.....	12
APPENDIX B Iggy Hill Lab Results.....	49
APPENDIX C Cape Blossom Drill Logs .....	57
APPENDIX D Cape Blossom Lab Results.....	83
APPENDIX E Symbols and Definitions, Soil Classification Systems.....	88



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.



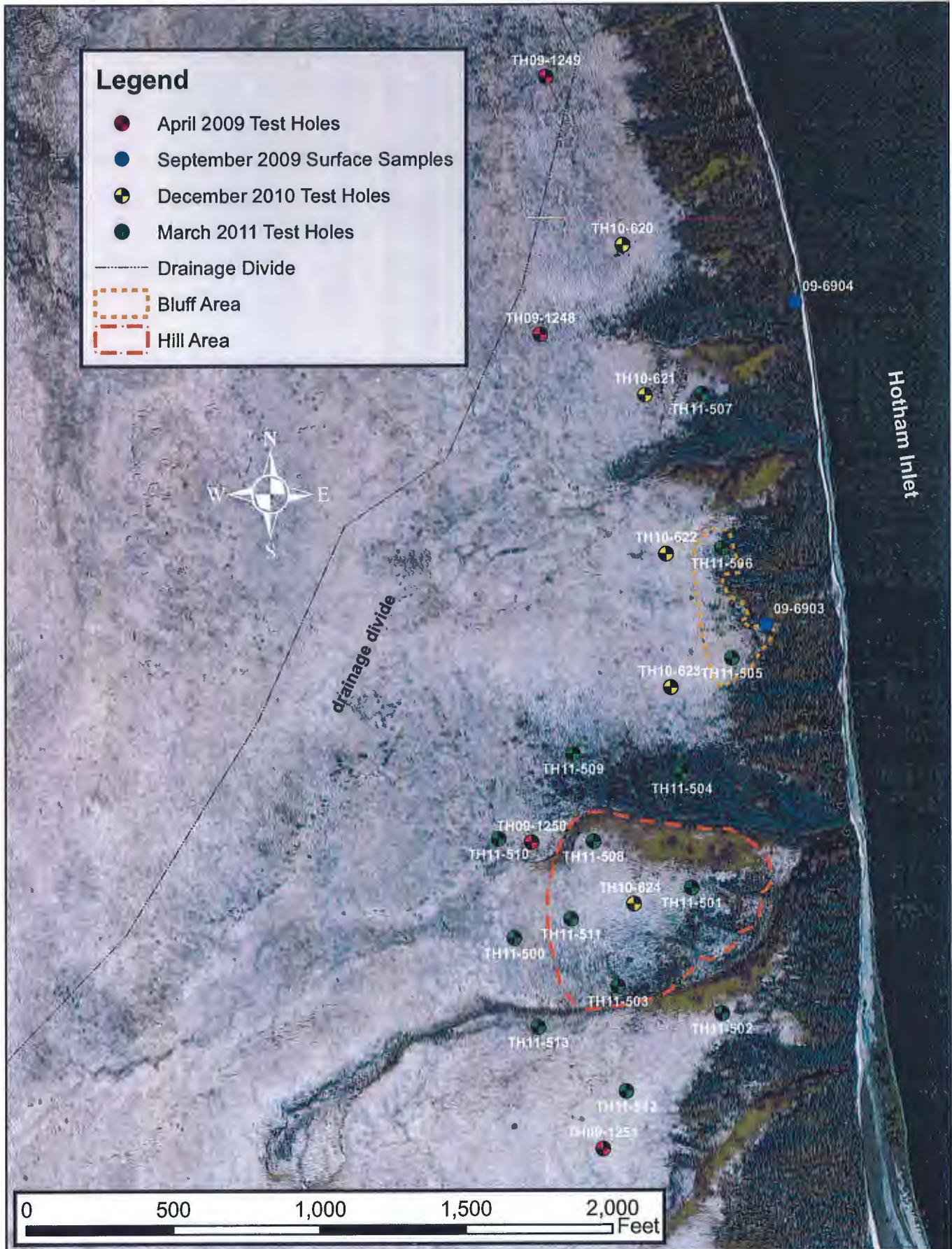


Figure 3. Iggy Hill Test Hole and Sample Locations

## 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 gravel 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**

<b>Area</b>	<b>Test Hole</b>	<b>Total Depth</b>	<b>Gravel Interval</b>	<b>Gravel Thickness</b>
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**

<b>Parameter</b>	<b>Sample 11-3012</b>	<b>Sample 11-3016</b>
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.



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**APPENDIX A**

**IGGY HILL DRILL LOGS**

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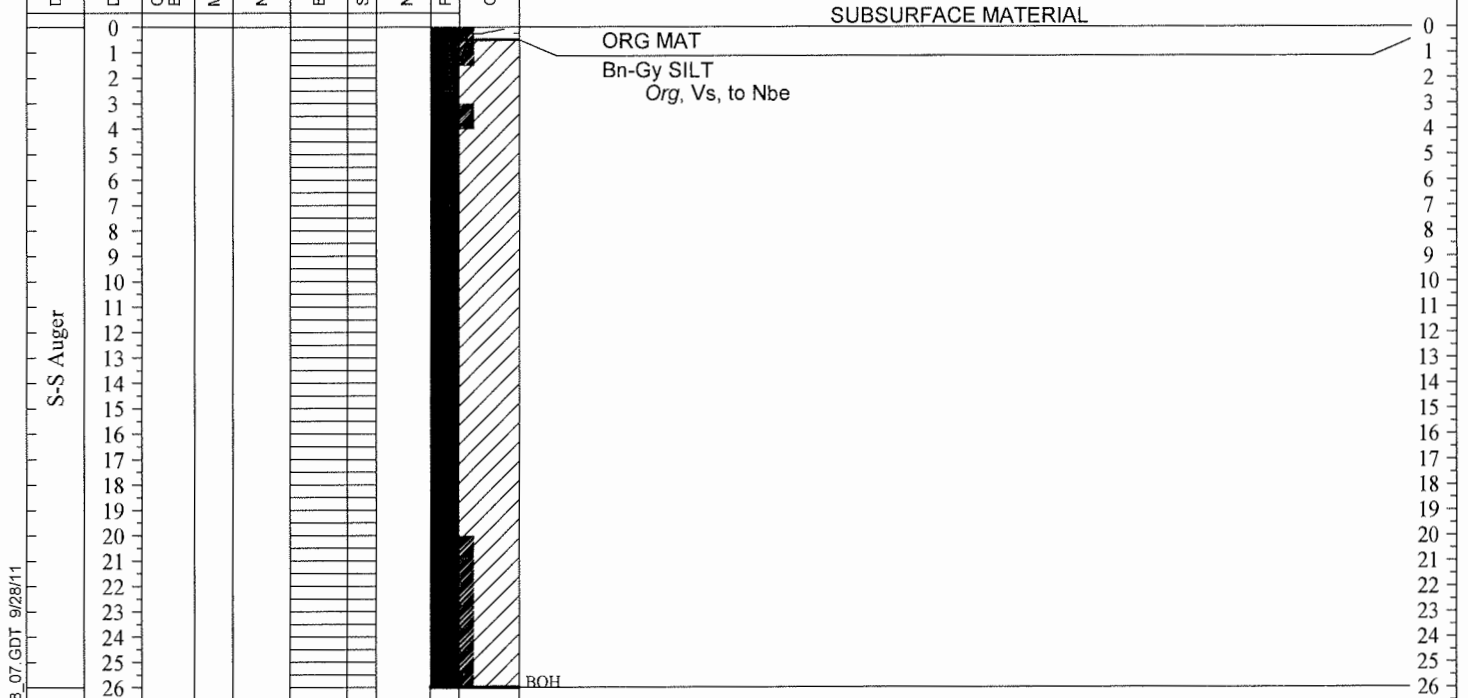


STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: NORTHEAST COAST FOR MS
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
								Depth in (ft.)			
								Time			
								Date			
								Symbol			



NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR AKDOT\_PRECON\_USCS.06\_28\_07.GDT 9/28/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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	Equipment Type	Mobile B-24
TH Finalized By	J ROWLAND	Weather	Fog, clouds, breezy, 10 F
		Vegetation	6 inches snow
		Station, Offset	
		Latitude, Longitude	N66.92757°, W162.28947°
		Elevation	180.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: NORTHEAST COAST FOR MS
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
S-S Auger	0										<p style="text-align: center;">SUBSURFACE MATERIAL</p> <p>ORG MAT</p> <p>Bn-Gy SILT</p> <p>Org, Vs, to Nbe</p> <p>BOH</p>
	1										
	2										
	3										
	4										
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NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07\_GDT\_9/28/11

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





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# FINAL TEST HOLE LOG

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	Equipment Type	Mobile B-24
TH Finalized By	J ROWLAND	Weather	Fog, clouds, breezy, 10 F
		Vegetation	1 ft snow
		Station, Offset	
		Latitude, Longitude	N66.92048°, W162.28975°
		Elevation	180.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: NORTHEAST COAST FOR MS
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
S-S Auger	0											SUBSURFACE MATERIAL
	1										ORG MAT	
	2										Bn-Gy SILT	
	3										Org, Vs	
	4											
	5											
	6											
	7											
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	16											
	17											
	18											
	19											
	20											
	21											
22											BOH	

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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



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# FINAL TEST HOLE LOG

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 Equipment Type Mobile B-24 Station, Offset \_\_\_\_\_  
 Weather P. cloudy, 10 mph, 15 F Latitude, Longitude N66.91765°, W162.28804°  
 TH Finalized By J ROWLAND Vegetation 1 ft snow Elevation 205.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: NORTHEAST COAST FOR MS	
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling		
S-S Auger	0											SUBSURFACE MATERIAL	
	1												
	2												ORG MAT
	3												Bn-Gy SILT
	4												Org, Vs, to Nbe
	5												
	6												
	7												
	8												
	9												
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	11												
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
22												BOH	

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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

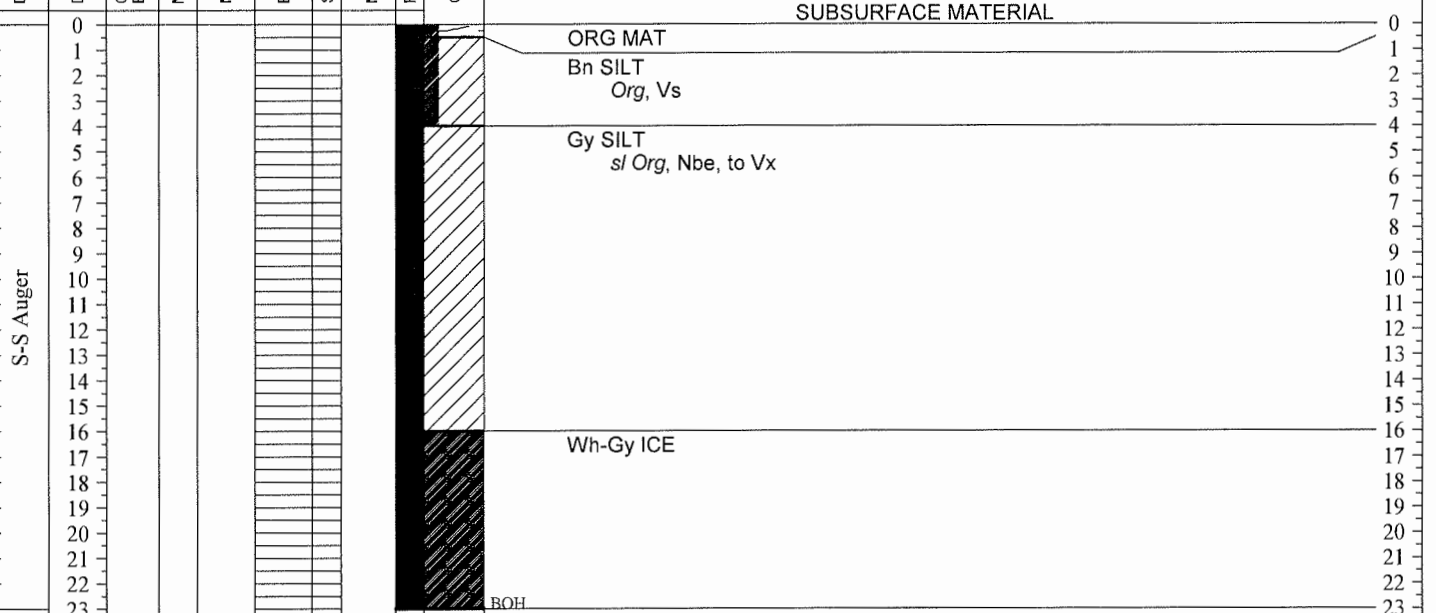


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Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type Mobile B-24 Station, Offset \_\_\_\_\_  
 Weather Snowing, 15 mph, 20 F Latitude, Longitude N66.91284°, W162.40533°  
 TH Finalized By J ROWLAND Vegetation 1 ft snow Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: NOTE: THIS TEST HOLE IS LOCATED 1/2 MILE SOUTH OF IGGY HILL, BEYOND THE SCOPE OF FIGURE 3.
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
								Depth in (ft.)			
								Time			
								Date			
								Symbol			



NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR AKDOT PRECON USCS\_06\_28\_07.GDT 11/15/11

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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									IGGY HILL MTERIAL SITE	
	1									SUBSURFACE MATERIAL	
	2									ORG MAT	
	3									wet	
	4									Bn SILT	
	5									wet, hi Org, Nbe	
	6									Gy-Bn SILT	
	7									wet, Nbe	
	8										
	9										
	10										
	11										
	12										
	13									Gy-Bn SILT	
	14									moist to wet	
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25										
	26										
	27										
	28										
	29										
	30										
	31										
	32										
	33										
	34									Gy-Bn Silty SAND	
	35									moist	
	36										
	37										
	38									Gy-Bn SILT	
	39									w/ Sand	
	40									wet, Nbe, fine	
	41										
	42										
	43										
	44										
	45										
	46									Gy-Bn SILT	
	47									moist to wet	
	48										
	49										
	50										
	51										
	52										
	53										
	54									Gy-Bn SILT	
	55									w/ Sand	

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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

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

AUGER AUGER  
10-3500  
10-3501



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Vegetation \_\_\_\_\_ Elevation 165.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0										SUBSURFACE MATERIAL
	1										ORG MAT wet
	2										Bn SILT wet, <i>hi Org</i> , Nbe
	3										Gy-Bn SILT wet, Vr, 10% to 25% ICE
	4										
	5										
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										Bn SILT wet, <i>hi Org</i> , Nbe
	17										Gy-Bn SILT moist
	18										
	19										
	20										
	21										
	22										
	23										Bn SILT moist, <i>hi Org</i>
	24										Gy-Bn SILT moist
	25										
	26										
	27										Gy-Bn SILT w/ Sand moist, fine
	28										
	29										Gy-Bn SILT moist
	30										
	31										Gy-Bn Sandy SILT moist, fine
	32										
	33										
	34										
	35										
	36										
	37										Gy-Bn SILT dry to moist
	38										
	39										
	40										
	41										
	42										
	43										
	44										
	45										
	46										
	47										
	48										
	49										
	50										
	51										
	52										Gy-Bn SILT w/ Gravel dry to moist
	53										
	54										SAMPLE 10-3502 (51.0-53.0):
	55										

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM GPJ NR AKDOT PRECON USCS.06 28.07 GDT 9/28/11

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	
	55									SUBSURFACE MATERIAL
	56									Gy-Bn SILT
	57									moist, trace gravel -.5"
	58									
	59									
	60									
	61									
	62									
	63									
	64									
	65									
	66									
	67			10-3503						Gy-Bn SILT
	68									w/ Gravel
	69									moist, -.75"
	70									SAMPLE 10-3503 (66.0-69.0):
	71									SAMPLE 10-3504 (69.0-74.0):
	72			10-3504						
	73									
	74									
	75									Gy-Bn Gravelly SILT
	76									moist
	77									
	78									
	79									
	80									
	81									
	82									
	83									
	84									
	85									Gy-Bn SILT
	86									w/ Gravel
	87									moist
	88									Gy-Bn Gravelly SILT
	89									moist
										Gy-Bn SILT
										moist
										BOH



# FINAL TEST HOLE LOG

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									IGGY HILL MTERIAL SITE	
	1									SUBSURFACE MATERIAL	
	2									ORG MAT	
	3									wet	
	4									Bn SILT	
	5									wet, hi Org, Nbe	
	6									Gy SILT	
	7									wet, Vr, 15% ice	
	8										
	9										
	10									PEAT	
	11									wet, Nbe	
	12									Gy-Bn SILT	
	13									wet, Vr, 15% ice	
	14										
	15									Bn SILT	
	16									moist, Org	
	17										
	18										
	19										
	20									Gy-Bn SILT	
	21									moist	
	22										
	23										
	24										
	25										
	26										
	27									Gy Sandy SILT	
	28									moist to wet, very fine	
	29										
	30										
	31										
	32										
	33										
	34										
	35										
	36										
	37									Gy SILT	
	38									moist	
	39										
	40										
	41										
	42									Gy-Bn SILT	
	43									dry to moist	
	44										
	45										
	46										
	47										
	48										
	49										
	50										
	51										
	52										
	53										
	54									Gy-Bn SILT	
	55										

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM GPJ NR AKDOT PRECON USCS 06 28 07 GDT 9/28/11

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

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



# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather Clear, -15 F, 10 mph Latitude, Longitude N66.92192°, W162.28645°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 175.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0										IGGY HILL MTERIAL SITE
	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										

NR AKDOT TEST HOLE LOG - USCS\_KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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



Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	
	55									SUBSURFACE MATERIAL
	56									Gy-Bn SILT moist
	57									
	58									
	59									
	60									
	61									
	62									
	63									Gy-Bn SILT w/ Gravel moist
	64									
	65									
	66									Gy-Bn SILT moist
	67									
	68									Gy-Bn SILT w/ Gravel moist, -2" angular
	69									
	70									
	71									Gy-Bn SILT moist
	72									
	73									Gy-Bn SILT w/ Gravel moist
	74									
	75									Gy-Bn SILT moist
	76									
	77									Gy-Bn SILT w/ Gravel moist
	78									
	79									Gy-Bn SILT moist, trace gravel, -.5" angular
	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

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather Clear, -10 F, 20 mph Latitude, Longitude N66.91991°, W162.28732°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 180.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	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										

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR AKDOT PRECON USCS 06\_28\_07.GDT 9/28/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number TH11-500  
 Project Number AKSAS 76884 Total Depth 49 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 N66.91959°, W162.29016°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 175.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0											SUBSURFACE MATERIAL
	1											ORG MAT
	2											Bn SILT moist to wet, <i>hi Org</i>
	3											Gy SILT wet, <i>Nbe</i>
	4											Bn SILT moist to wet, <i>hi Org</i>
	5											Gy-Bn SILT wet, <i>Org</i> , with .5" peat layers
	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											

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR AKDOT PRECON USCS 06\_28\_07 GDT 9/28/11

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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									SUBSURFACE MATERIAL	
	1									ORG MAT	
	2									Gy SILT wet, Vs, 25% ice	
	3									Gy-Bn SILT wet, Org, Vs, 5% to 25% ice	
	4										
	5										
	6										
	7									Bn SILT wet, hi Org, Nbe	
	8										
	9									Gy-Bn Sandy SILT w/ Gravel wet, 10% ice, -.75"	
	10										
	11										
	12										
	13									Gy-Bn Silty SAND wet, Vs, 10% ice	
	14										
	15									Gy-Bn Poorly-graded GRAVEL w/ Silt & Sand w/ Cobbles wet, -2"	
	16										
	17										
	18									SAMPLE 11-3000 (15.0-19.0): GM, 32.5% -200, NV, NP	
	19										
	20									Gy-Bn SILT w/ Gravel wet	
	21										
	22									Gy-Bn Sandy SILT wet	
	23										
	24										
	25									Gy-Bn Silty GRAVEL w/ Sand moist to wet, -2"	
	26										
	27									SAMPLE 11-3001 (22.0-31.0): GM, 21.7% -200, SSc 0.7, SSf 0.0, LA 22, DEG 50, NV, NP	
	28										
	29										
	30										
	31									Gy-Bn Poorly-graded GRAVEL w/ Silt & Sand moist to wet, -.75" to -2"	
	32										
	33									SAMPLE 11-3002 (31.0-44.0): GP-GM, 10.2% -200, SSc 0.1, SSf 0.0, LA 22, DEG 50, NV, NP	
	34										
	35										
	36										
	37										
	38										
	39										
	40										
	41										
	42										
	43										
	44										
	45										
	46										
	47										
	48										
	49										
	50										
	51										
	52										
	53										
	54									Gy-Bn Sandy SILT	
	55										

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log			
	55		AUGER	11-3003						SUBSURFACE MATERIAL		
	56											w/ Gravel moist, -.375" to -.75"
	57											SAMPLE 11-3003 (54.0-59.0): SM, 24.4% -200, NV, NP
	58											
	59											
	60											
	61											
	62											
	63											
	64											
	65											
	66											
	67											
	68											
	69											
	70											
	71											
	72											
	73											
	74		AUGER	11-3004						SAMPLE 11-3004 (74.0-77.0): SM, 24.4% -200, NV, NP		
	75											
	76											
	77											
	78											
	79											
										Gy-Bn Silty SAND moist to wet, coarse		
										BOH		



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather Clear, -5 F, calm Latitude, Longitude N66.9189°, W162.28522°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 165.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0											SUBSURFACE MATERIAL
	1											ORG MAT
	2											Gy-Bn SILT moist
	3											
	4											
	5											Gy SILT moist
	6											
	7											
	8											ICE w/ Silt Vs
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											Gy-Bn SILT wet, Org
	19											
	20											
	21											
	22											
	23											
	24											Gy-Bn SILT wet, Org, Vs, 80% ice
	25											
	26											
	27											
	28											
	29											
	30											
	31											
	32											
	33											
	34											
	35											
	36											ICE w/ Silt Vs
	37											
	38											
	39											
	40											Gy-Bn SILT wet, hi Org, Vs
	41											
	42											
	43											
	44											
	45											
	46											
	47											
	48											
	49											BOH

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07\_GDT\_9/28/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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

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

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM GPJ NR AKDOT PRECON\_USCS\_06\_28\_07\_GDT\_9/28/11

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



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

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM.GPJ NR AKDOT PRECON USCS.06.28.07.GDT 9/28/11



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather Clear, -5 F, calm Latitude, Longitude N66.92112°, W162.28619°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 160.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0											SUBSURFACE MATERIAL
	1											ORG MAT
	2											Gy-Bn SILT wet, <i>hi Org</i> , Nbe
	3											Gy SILT wet, Nbe
	4											Gy-Bn SILT moist, <i>Org</i>
	5											Bn SILT wet, <i>hi Org</i> , Nbe
	6											Gy-Bn SILT wet, <i>Org</i> , Nbe
	7											Gy-Bn SILT moist, <i>Org</i>
	8											ICE w/ Silt
	9											Gy-Bn Silty SAND moist to wet, fine
	10											Gy-Bn Sandy SILT moist to wet

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR AKDOT PRECON USCS.06.28.07.GDT 9/28/11

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





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

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

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

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM GPJ NR AKDOT PRECON USCS 06\_28\_07 GDT 9/28/11

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

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number TH11-506  
 Project Number AKSAS 76884 Total Depth 89 feet  
 Field Geologist K. MAXWELL Dates Drilled 3/11/2011  
 Field Crew S. PARKER, P. LANIGAN Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather Clear, -10 F, 10 mph Latitude, Longitude N66.92321°, W162.28525°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 165.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									IGGY HILL MTERIAL SITE	
	1									SUBSURFACE MATERIAL	
	2									ORG MAT	
	3									Bn SILT moist, <i>Org</i>	
	4									Bn SILT wet, <i>hi Org</i>	
	5									Bn SILT moist, <i>Org</i>	
	6									Gy-Bn SILT wet, <i>sl Org</i> , Nbe, 10% to 25% ice	
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17									Gy-Bn SILT w/ Sand wet, Nbe, fine	
	18										
	19										
	20										
	21										
	22									Gy-Bn Gravelly SILT w/ Sand wet, fine, -1" ~5% ice	
	23										
	24										
	25										
	26										
	27										
	28									Gy-Bn SILT moist	
	29										
	30										
	31										
	32										
	33									Gy-Bn Gravelly SILT moist, -2"	
	34										
	35									Gy-Bn SILT moist	
	36										
	37									Gy-Bn Silty GRAVEL moist	
	38										
	39									Gy-Bn SILT moist	
	40										
	41									Gy-Bn Silty GRAVEL moist, -.75" to -2"	
	42										
	43									Gy-Bn SILT w/ Sand wet, -.375"	
	44										
	45									Gy-Bn Silty SAND w/ Gravel moist, -.75"	
	46										
	47										
	48									Gy-Bn Silty GRAVEL w/ Sand moist. <i>Org</i> . -1"	
	49										
	50										
	51										
	52										
	53									SAMPLE 11-3013 (49.0-54.0): GM, 21.7% -200, NM 16.6%, ORG 7.6%, NV, NP	
	54										
	55										

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07\_GDT\_11/15/11

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	
	55									SUBSURFACE MATERIAL
	56								Gy-Bn Poorly-graded SAND w/ Gravel dry to moist	
	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									
	76								Gy-Bn Gravelly SILT w/ Sand moist, -.75"	
	77									
	78								Gy-Bn Silty GRAVEL w/ Sand moist to wet	
	79									
	80								Gy-Bn Silty SAND moist to wet, -.375"	
	81									
	82								Gy-Bn Silty SAND w/ Gravel moist to wet, -.75"	
	83									
	84									
	85								Gy-Bn Silty SAND moist to wet, coarse	
	86									
	87								Gy-Bn Silty SAND w/ Gravel moist to wet, -.75"	
	88									
	89								Gy-Bn Silty SAND moist to wet, coarse	





# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number TH11-507  
 Project Number AKSAS 76884 Total Depth 59 feet  
 Field Geologist K. MAXWELL Dates Drilled 3/12/2011  
 Field Crew S. PARKER, P. LANIGAN Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather Clear, -5 F, calm Latitude, Longitude N66.92464°, W162.28574°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 165.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									IGGY HILL MTERIAL SITE	
	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										

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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



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

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07\_GDI 9/28/11



# FINAL TEST HOLE LOG

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0										SUBSURFACE MATERIAL
	1										ORG MAT
	2										Gy-Bn SILT
	3										moist, <i>sl</i> Org
	4										
	5										
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										ICE
	19										Vs, 95% ice
	20										
	21										
	22										
	23										
	24										
	25										Gy-Bn SILT
	26										wet, <i>Org</i>
	27										
	28										
	29										
	30										
	31										
	32										Gy-Bn SILT
	33										w/ Gravel
	34										wet, -2", 25% ice
	35										
	36		AUGER								Gy-Bn Silty GRAVEL
	37										w/ Sand
	38			11-3016							wet, <i>Org</i> , Nbe, -2"
	39										SAMPLE 11-3016 (35.0-39.0): GM, 35.4% -200, NM 27.0%, ORG 9.8%, NV, NP
	40										SAMPLE 11-3017 (39.0-44.0): 10.1% -200
	41		AUGER								Gy-Bn Poorly-graded GRAVEL
	42			11-3017							w/ Sand
	43										moist to wet, -2.5"
	44										
	45										
	46										
	47										
	48										
	49										
	50										
	51										
	52										
	53										
	54										Gy-Bn Poorly-graded GRAVEL
	55										

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log		
	55										SUBSURFACE MATERIAL
	56										w/ Sand
	57										w/ Cobbles
	58										moist to wet, coarse, -2", 5" to 6" cobbles
	59										
	60										
	61										
	62										
	63										
	64										
	65										
	66										
	67										
	68										Gy-Bn Silty SAND
	69										w/ Gravel
	70										w/ Cobbles
	71										moist to wet, -2"
	72										SAMPLE 11-3018 (67.0-74.0): 28.6% -200
	73										
	74										
	75										Gy-Bn Gravelly SILT
	76										w/ Sand
	77										moist to wet, -2", 8" cobbles
	78										
	79										
	80										
	81										
	82										
	83										
	84										BOH



# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number TH11-509  
 Project Number AKSAS 76884 Total Depth 49 feet  
 Field Geologist K. MAXWELL Dates Drilled 3/13/2011  
 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 \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Size Blows / ft	Sample Data					Run Data				Structural Data	Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE	
			Method	Number	Blow Count	Sample Interval	N-Value	Run Number	Time (minutes)	ROD	Recovery				Longest Pc. (in.)	While Drilling		After Drilling
	0																	SUBSURFACE MATERIAL
	1																	ORG MAT
	2																	PEAT
	3																	moist to wet
	4																	Bn SILT
	5																	dry to moist, <i>hi Org</i>
	6																	Gy-Bn SILT
	7																	wet, Nbe
	8																	Bn SILT
	9																	moist to wet, <i>hi Org, Nbe</i>
	10																	
	11																	
	12																	
	13																	
	14																	
	15																	
	16																	Gy-Bn Sandy SILT
	17																	wet, fine
	18																	
	19																	
	20																	Gy Silty SAND
	21																	wet, Nbe, -.5"
	22																	
	23																	
	24																	
	25																	
	26																	
	27																	
	28																	
	29																	
	30																	
	31																	Gy Poorly-graded SAND
	32																	w/ Gravel
	33																	moist to wet
	34																	Gy-Bn Sandy SILT
	35																	wet, Nbe
	36																	Gy-Bn Sandy SILT
	37																	w/ Gravel
	38																	wet
	39																	Gy-Bn Sandy SILT
	40																	wet, Nbe
	41																	Gy-Bn Sandy SILT
	42																	w/ Gravel
	43																	wet
	44																	Gy-Bn Sandy SILT
	45																	wet
	46																	Gy-Bn Sandy SILT
	47																	w/ Gravel
	48																	wet
	49																	Gy-Bn Sandy SILT
																		wet
																		Gy-Bn Sandy SILT
																		w/ Gravel
																		wet
																		Gy-Bn Sandy SILT
																		wet

NR AKDOT TEST CORE LOG - USCS - KOTZ CAPE BLOSSOM GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07\_GDI\_9/27/11

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



STATE OF ALASKA DOT/PP  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									IGGY HILL MTERIAL SITE	
	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										

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR AKDOT PRECON USCS.06.28.07 GDT 9/28/11

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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number TH11-511  
 Project Number AKSAS 76884 Total Depth 100 feet  
 Field Geologist K. MAXWELL Dates Drilled 3/14/2011  
 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

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									SUBSURFACE MATERIAL	
	1									ORG MAT	
	2									Gy-Bn SILT	
	3									moist to wet, <i>sl Org</i>	
	4										
	5									Bn SILT	
	6									moist, <i>hi Org</i>	
	7									Gy-Bn SILT	
	8									wet, <i>sl Org</i>	
	9									Gy-Bn Poorly-graded SAND	
	10									wet, fine	
	11									Gy-Bn Silty SAND	
	12									w/ Gravel	
	13									moist, <i>sl Org</i> , -0.75"	
	14									SAMPLE 11-3020 (11.0-19.0): SM, 20.3% -200, NM 12.9%, ORG 0.8%,	
	15									SSc 0.1, SSf 0.0, NV, NP	
	16									Gy-Bn SILT	
	17									w/ Gravel	
	18									moist, <i>sl Org</i> , -0.5"	
	19									Gy-Bn Silty SAND	
	20									w/ Gravel	
	21									moist, <i>sl Org</i> , -1.5"	
	22									Gy-Bn Silty GRAVEL	
	23									w/ Sand	
	24									moist, <i>sl Org</i> , -2"	
	25									SAMPLE 11-3021 (19.0-24.0): GM, 15.4% -200, NM 6.4%, ORG 0.7%, NV,	
	26									NP	
	27									Gy-Bn Silty SAND	
	28									w/ Gravel	
	29									moist, -1"	
	30									Gy-Bn Silty GRAVEL	
	31									w/ Sand	
	32									moist, -1"	
	33									Gy-Bn Silty SAND	
	34									w/ Gravel	
	35									moist, -1"	
	36									Gy-Bn Silty GRAVEL	
	37									w/ Sand	
	38									moist, -1" to -2"	
	39									Gy-Bn Silty SAND	
	40									w/ Gravel	
	41									moist, -0.75"	
	42									Gy-Bn Silty SAND	
	43									w/ Gravel	
	44									moist, -1" to -1.5", coarse	
	45									SAMPLE 11-3022 (39.0-44.0): SM, 20.4% -200, LA 27, DEG 46, NV, NP	
	46										
	47										
	48										
	49										
	50										
	51										
	52										
	53										
	54									SAMPLE 11-3023 (54.0-59.0): SM, 17.5% -200, NV, NP	
	55										

NR AKDOT TEST HOLE LOG - USCS - KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07\_GDT\_9/28/11

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

Test Hole Number TH11-511

NR AKDOT TEST HOLE LOG - USCS KOTZ CAPE BLOSSOM GPJ NR AKDOT PRECON USCS\_06\_28\_07 GDT 9/28/11

Drilling Method	Depth in (Feet)	Casing Blows / ft	Method	Number	Blow Count	Sample Interval	N-Value	Frozen	Graphic Log	
	55									SUBSURFACE MATERIAL
	56		AUGER	11-3023						
	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									Gy-Bn Silty SAND w/ Gravel moist, -1"
	68									
	69									Gy-Bn Silty GRAVEL w/ Sand moist, <i>sl Org</i> , -1"
	70		AUGER	11-3024						
	71									
	72									SAMPLE 11-3024 (69.0-74.0): GM, 16.6% -200, NM 6.4%, ORG 0.7%, NV, NP
	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									Gy-Bn Poorly-graded SAND w/ Silt & Gravel moist, -.75"
	87									
	88									Gy-Bn Silty SAND w/ Gravel moist, -.75"
	89									
	90									Gy-Bn Silty SAND w/ Gravel moist, -.75" to -1"
	91									
	92									Gy-Bn Silty GRAVEL w/ Sand moist, -.75"
	93									
	94									
	95									
	96									Gy-Bn Poorly-graded SAND w/ Silt & Gravel moist, -1"
	97									
	98									
	99									
	100									BOH



STATE OF ALASKA DOT/PP  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number TH11-512  
 Project Number AKSAS 76884 Total Depth 44 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 N66.91818°, W162.28749°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation 190.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS: IGGY HILL MTERIAL SITE
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0											SUBSURFACE MATERIAL
	1											ORG MAT
	2											Gy-Bn SILT moist to wet
	3											
	4											
	5											PEAT
	6											wet
	7											Gy-Bn SILT
	8											wet, Org
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											Bn SILT
	18											wet, hi Org
	19											
	20											Gy-Bn SILT
	21											moist to wet
	22											
	23											
	24											Bn SILT
	25											wet, hi Org, with 1" ice layers
	26											
	27											
	28											
	29											
	30											
	31											PEAT
	32											wet
	33											Bn SILT
	34											wet, Org, with 1" ice layers
	35											Gy-Bn Sandy SILT
	36											wet, fine
	37											Bn SILT
	38											moist to wet, hi Org
	39											
	40											
	41											
	42											
	43											
	44											

NR AKDOT TEST HOLE LOG - USCS. KOTZ CAPE BLOSSOM.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 9/28/11

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

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 Vegetation \_\_\_\_\_ Elevation 160.0

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0									IGGY HILL MTERIAL SITE	
	1										
	2										
	3										
	4										
	5		SS	11-3025							
	6										
	7										
	8										
	9										
	10										
	11		AUGER	11-3026							
	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										

NR AKDOT TEST HOLE LOG - USCS. KOTZ CAPE BLOSSOM.GPJ NR AKDOT\_PRECON\_USCS.06.28.07.GDT 9/28/11

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

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**APPENDIX B**

**IGGY HILL LAB RESULTS**

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**STATE OF ALASKA DEPARTMENT OF TRANSPORTATION  
NORTHERN REGION  
LABORATORY TESTING REPORT**

PROJECT NAME: Kotzebue to Cape Blossom Road  
 PROJECT NUMBER: 76884  
 AKSAS NUMBER: K. MAXWELL  
 SAMPLED BY:  
 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 Gravel	3"	100	100				
	2"	94	84				
	1.5"	88	76		100	100	100
	1.0"	82	64		99	99	99
	0.75"	79	58		96	98	97
	0.5"	72	51		87	92	95
	0.375"	68	46		80	87	90
	#4	59	35		56	65	74
Sand	#8	50	26		36	40	61
	#10	48	25		34	39	60
	#16	40	18		26	34	53
	#30	24	12		21	30	46
	#40	16	9		20	28	42
	#50	11	6		18	26	39
	#60	10	5		18	25	37
	#80	8	4		16	23	35
#100	7	3		16	22	33	
Silt/Clay #200	4.5	2.4		13.2	18.9	27.9	37.9
Hydro	0.02						
	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 <sup>1</sup>				Org <sup>1</sup>
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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
	0.75"	95	94	92	99	90	98
	0.5"	85	79	76	97	82	95
	0.375"	76	71	63	94	69	93
	#4	58	57	37	80	59	89
	#8						
	#10	51.4	44.9	24.6	58.0	50.4	86.0
	#16						
Sand	#20	47.8	38.9	19.1	45.0	45.3	79.1
	#40	44.2	34.0	16.3	38.0	41.5	72.1
	#50						
	#60						
	#80						
	#100	37.1	26.4	12.5	29.0	36.5	60.9
	#200	32.5	21.7	10.2	24.4	33.0	52.5
Silt/Clay							
	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. <sup>1</sup> 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
Sand #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	
#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							
ORGANICS					16.6		18.2
SP. GR. (FINE)					7.6		10.7
SP. GR. (COARSE)							
MAX. DRY DENSITY							
OPTIMUM MOISTURE							
L.A. ABRASION							
DEGRAD. FACTOR							
SODIUM SULF. (CRSE)							
SODIUM SULF. (FINE)							
NORDIC ABRASION							
REMARKS					Org <sup>1</sup>		Org <sup>1</sup>
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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
Sand #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
#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 <sup>1</sup>						
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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				
Sand #8							
#10	39.8		48.3				
#16							
#20	32.4		41.1				
#40	26.7		36.7				
#50							
#60							
#80							
#100	19.9		28.2				
Silt/Clay #200	16.6		22.0				
Hydro 0.02							
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. <sup>1</sup> 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  
**Liquid Limit:** NV  
**Tested by:** Amy Steiner, NR# 705

**AASHTO Classification:** A-1-b  
**Plasticity Index:** NP

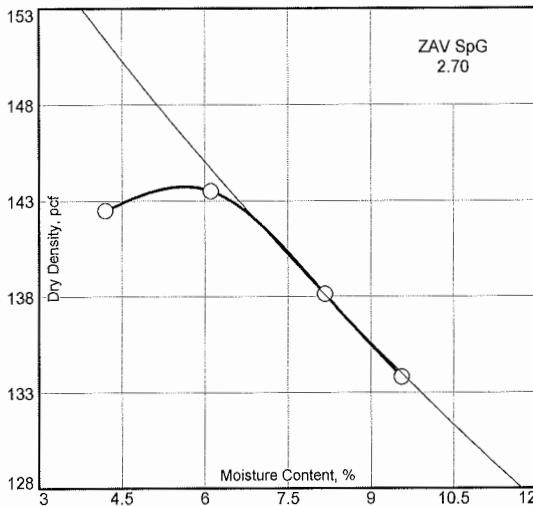
**Checked by:** Jim Mack, Supervisor



**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

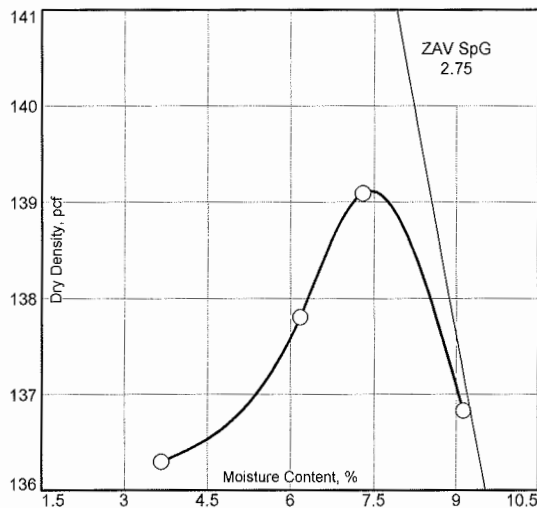
**Checked by:** Jim Mack, Supervisor

**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
<b>Wt. M+S</b>	10257.6	10428.1	10527.7	10530.4
<b>Wt. M</b>	5450.6	5450.6	5450.6	5450.6
<b>Wt. W+T</b>	5482.1	5699.6	6027.3	6005.1
<b>Wt. D+T</b>	5311.9	5417.9	5682.6	5581.0
<b>Tare</b>	677.4	855.5	958.2	935.0
<b>Moist.</b>	3.7	6.2	7.3	9.1
<b>Dry Den.</b>	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.

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**APPENDIX C**

**CAPE BLOSSOM DRILL LOGS**

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STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.7289°, W162.43659°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0								0.5		SUBSURFACE MATERIAL
	0 - 4						ICE				
	4 - 9						WATER				
	9 - 10		SPT	10-4030	1 2 2 4		Bn Poorly-graded SAND Fine sand				
	10 - 17		SPT	10-4031	2 3 5 6	8	Bk-Bn SILT moist, loose, <i>Org</i> SAMPLE 10-4030 (9.5-10.5): NM 35.3%, ORG 3.6%				
	17 - 22		SPT	10-4032	1 2 3 3	5	SAMPLE 10-4031 (16.0-17.0): NM 41.9%, ORG 6.0%				
	22 - 27		SPT	10-4033	1 3 2 4	5	SAMPLE 10-4032 (21.0-22.0): ML, 92.3% -200, NM 41.2%, ORG 7.4%, NV, NP				
	27 - 31		SPT	10-4034	2 3 4 6	7	SAMPLE 10-4033 (26.0-27.0): NM 37.6%, ORG 3.8%				
	31 - 32						BOH				SAMPLE 10-4034 (31.0-32.0): NM 32.8%, ORG 4.5%

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1508  
 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 N66.72755°, W162.43739°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0								0.5		SUBSURFACE MATERIAL
	1										ICE
	2										
	3										
	4										WATER
	5										
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14		SPT	10-4035	3						Bn Silty SAND loose, <i>sl Org</i>
	15				3						SAMPLE 10-4035 (13.0-14.0): SM, 30.9% -200, ORG 1.4%, NV, NP
	16				3						Bk-Bn SILT moist, loose, <i>sl Org</i> , Shell fragments, darker organic-rich bands, some high organic
	17				4						
	18										
	19										
	20										
	21		SPT	10-4036	2						SAMPLE 10-4036 (20.0-22.0):
	22				2						
	23				4						
	24				4						
	25										
	26				2						
	27				3						
	28				5						
	29				6						
	30										
	31		SPT	10-4037	2						SAMPLE 10-4037 (30.0-31.5): NM 8.1%, ORG 3.3%
	32				2						
					3						
					3						

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project	Kotzebue to Cape Blossom Road	Test Hole Number	10-1509
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
TH Finalized By	K. Maxwell	Weather	
		Vegetation	
		Station, Offset	
		Latitude, Longitude	N66.7249°, W162.43875°
		Elevation	

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				N-Value	Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval				While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1											ICE
	2											
	3											
	4											
	5											WATER
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											
	19				4		6					Bn Poorly-graded SAND w/ Silt & Gravel sl Org
	20				3							SAMPLE 10-4038 (20.0-21.0): ORG 1.6%
	21				3							Bk-Bn Sandy SILT moist, Org
	22				3							SAMPLE 10-4039 (21.0-22.0): NM 52.6%, ORG 11.6%
	23				6							
	24											
	25											
	26				2		9					SAMPLE 10-4040 (25.0-27.0): ML, 70% -200, ORG 13.9%, NV, NP
	27				3							
	28				3							
	29				6							
	30				9							
	31				2							
	32				3							
					3							
					5							
												BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.7222°, W162.4401°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1											ICE
	2											
	3											
	4											WATER
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											
	19											
	20											
	21											
	22				1							Bn Poorly-graded SAND
	23				2							w/ Silt & Gravel
	24				5							SHELL FRAGMENTS
	25				5							Bk-Bn SILT
	26											moist, loose, sl Org, SHELL FRAGMENTS
	27				1							SAMPLE 10-4041 (25.0-27.0): NM 38.3%, ORG 3.7%
	28				3							
	29				3							
	30				3							
	31				4							
	32				6							
					8							
												BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

H-S Auger

SPT  
10-4041

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:	
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling		
	0								Depth in (ft.)	0.5			
	1								Time				
	2								Date				
	3								Symbol	▼			
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25		SPT	10-4042	2 1 4 4	5							
	26												
	27												
	28												
	29												
	30												
	31		SPT		2 3 4 5	7							
	32												

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1512  
 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 N66.71689°, W162.44279°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0								Depth in (ft.) 0.5		SUBSURFACE MATERIAL
	1										ICE
	2										
	3										
	4										WATER
	5										
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25										
	26										Bk-Bn SILT
	27			1		4	8				moist, s/ Org, SHELL FRAGMENTS
	28			4		4					
	29			4		6					
	30			6							Bk-Bn SILT
	31			3		5	11				w/ Sand
	32			5		6					moist, s/ Org, SHELL FRAGMENTS
				6		6					SAMPLE 10-4043 (30.0-32.0): ORG 2.6%
				6							BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

H-S Auger

SPT  
10-4043

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1											ICE
	2											
	3											
	4											WATER
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											
	19											
	20											
	21											
	22											
	23											
	24											
	25											
	26											
	27											Bk-Gy Poorly-graded SAND w/ Silt sl Org, SHELL FRAGMENTS
	28											
	29											
	30											SAMPLE 10-4044 (30.0-32.0): SP-SM, 7.2% -200, ORG 0.8%, NV, NP
	31											
	32											BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

H-S Auger

SPT

10-4044

3  
3  
5  
6

8

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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.719°, W162.43466°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0								0.5			
	1											
	2											
	3											
	4											
	5											
	6											
	7											
	8											
	9											
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	15											
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	18											
	19											
	20											
	21											
	22											
	23											
	24											
	25			3								
	26			4								
	27			5								
	28			6								
	29											
	30											
	31			2								
	32			4								
				4								
				5								

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

H-S Auger

SPT

10-4045

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72166°, W162.43326°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				N-Value	Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval				While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1							ICE				
	2											
	3											
	4							WATER				
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											
	19											
	20											
	21											
	22		SPT	10-4046	1			Bn SILT				
	23				3			w/ Sand				
	24				4			loose				
	25				5			SAMPLE 10-4046 (21.5-22.5): ML, 71.1% -200, NV, NP				
	26				2		6	Bk-Bn SILT				
	27				2			moist, loose, s/ Org				
	28				4							
	29				4							
	30											
	31		SPT	10-4047	4		14	Bn Poorly-graded SAND				
	32				6			w/ Silt				
					8			s/ Org				
					9			Bk-Bn SILT				
								moist, loose, s/ Org, sHELL FRAGMENTS				
								SAMPLE 10-4047 (31.0-32.0): NM 28.2%, ORG 3.7%				

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72434°, W162.4319°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				N-Value	Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval				While Drilling	After Drilling	
	0								Depth in (ft.)	0.5		
	1								Time			
	2								Date			
	3								Symbol	▼		
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18				2							
	19				1							
	20				1							
	21				3							
	22											
	23											
	24											
	25											
	26				1							
	27				2							
	28				1							
	29				4							
	30											
	31				2							
	32				3							
					4							
					5							

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

H-S Auger

SPT 10-4048

3

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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	Equipment Type	CME 45B
TH Finalized By	K. Maxwell	Weather	
		Vegetation	
		Station, Offset	
		Latitude, Longitude	N66.72702°, W162.43057°
		Elevation	

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				N-Value	Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval				While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1											ICE
	2											
	3											
	4											WATER
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13			1								Bn Poorly-graded SAND loose
	14			1								Bk -Bn SILT moist, loose, <i>sl Org</i>
	15			1								
	16			3								
	17											
	18											
	19											
	20											
	21		SPT	10-4049	1							SAMPLE 10-4049 (20.0-22.0): ORG 3.1%, NV, NP
	22				2							
	23				2							
	24				3		4					
	25											
	26		SPT	10-4050	WOR							Bk-Bn Silty SAND wet, loose, <i>sl Org</i>
	27				WOR							SAMPLE 10-4050 (25.0-27.0): SM, 19.7% -200, NM 24.7%, ORG 0.9%, NV, NP
	28				5							
	29				8							
	30											
	31				3							
	32				7							
					8							
					9							Bk -Bn Sandy Silt moist to wet, <i>sl Org</i>
												BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11 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



# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1518  
 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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72847°, W162.42984°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				N-Value	Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval				While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1							ICE				
	2											
	3											
	4											
	5							WATER				
	6											
	7											
	8											
	9											
	10			1		3	8	Bn Silty SAND				
	11			3		5		wet, loose, TRACE GRAVEL				
	12			5		3						
	13											
	14							Poorly-graded GRAVEL				
	15			1				w/ Silt & Sand				
	16			4				wet				
	17			5				Bn Silty SAND				
	18			6				w/ Gravel				
	19							wet				
	20							Bk -Bn PEAT				
	21							wet				
	22							Bk-Bn SILT				
	23							moist, very loose, <i>sl Org</i>				
	24							SAMPLE 10-4051 (16.0-17.0): NM 37.6%				
	25											
	26							Bk-Bn Silty SAND				
	27							wet, very loose, <i>sl Org</i>				
	28							SAMPLE 10-4052 (25.0-27.0): SM, 33.9% -200, NV, NP				
	29											
	30							Bk-Bn SILT				
	31							moist, loose, <i>sl Org</i>				
	32											

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

H-S Auger

SPT

10-4051

SPT

10-4052

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72865°, W162.43324°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0								0.5		SUBSURFACE MATERIAL
	0-4						ICE				
	4-9						WATER				
	9-10			3			Bn Poorly-graded SAND wet				
	10-18			2			Bk-Bn SILT moist, loose, <i>sl Org</i> , MINOR FINE SAND, THIN FIBROUS ORGANIC LAYERS				
	18-19			3			Bn Poorly-graded SAND wet				
	19-20			4			Bk-Bn SILT moist, very loose, <i>sl Org</i>				
	20-21			WOR							
	21-22			1							
	22-23			2							
	23-24			3			Bn Poorly-graded SAND wet, loose, <i>sl Org</i>				
	24-25										
	25-26			WOR			SAMPLE 10-4053 (25.0-27.0): ORG 1.4%				
	26-27			2							
	27-28			5							
	28-29			8							
	29-30										
	30-31			3							
	31-32			7			Bk-Bn SILT moist, loose, <i>sl Org</i>				
	32			9			BOH				
				12							

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72453°, W162.4222°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0							Depth in (ft.)	0.5		
	1							Time			
	2							Date			
	3							Symbol	▼		
	4							SUBSURFACE MATERIAL			
	5							ICE			
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25										

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07\_GDT 11/15/11

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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0								0.5			
	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											

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/15/11 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



# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1523  
 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 N66.7218°, W162.46197°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0								0.5		SUBSURFACE MATERIAL	
	1											
	2											
	3											
	4											
	5										WATER	
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											
	19											
	20											
	21											
	22										Bk-Bn SILT w/ Sand moist, loose, sl Org	
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											
	31											
	32											
	33											
	34										BOH	

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/15/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1524  
 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 N66.71698°, W162.4715°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0								Depth in (ft.)	0.5		SUBSURFACE MATERIAL
	1							Time				
	2							Date				
	3							Symbol	▼			
	4											
	5											ICE
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											
	19											
	20											
	21											
	22											
	23											
	24											
	25											
	26											
	27											
	28											Bn Poorly-graded SAND
	29											Bk-Bn SILT w/ Sand moist, loose, <i>sl Org</i>
	30											
	31											
	32											
	33											
	34											ROH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/15/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1525  
 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 N66.7197°, W162.47009°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0							Depth in (ft.)	0.5		SUBSURFACE MATERIAL
	1							Time			
	2							Date			
	3							Symbol	▼		
	4										
	5										ICE
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25										Bk-Bn SILT w/ Sand moist, loose, sl Org
	26										
	27										
	28										
	29										
	30										
	31										
	32										
	33										
	34										BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/15/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72499°, W162.4674°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1											ICE
	2											
	3											
	4											WATER
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	18											Poorly-graded SAND w/ Gravel loose
	19											
	20											
	21											Bk-Bn SILT w/ Sand loose, <i>sl Org</i> , TRACE GRAVEL AT 28'
	22											
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											SAMPLE 10-4054 (30.0-34.0): ML, 83.3% -200, ORG 3.2%, NV, NP
	31											
	32											
	33											
	34											BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/15/11

S-S Auger

AUGER

10-4054

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

Project Kotzebue to Cape Blossom Road Test Hole Number 10-1527  
 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 N66.72908°, W162.46546°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0							0.5			
	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										

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GPJ NR AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/15/11

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



STATE OF ALASKA DOT/PP  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0							Depth in (ft.)	0.5		
	1							Time			
	2							Date			
	3							Symbol	▼		
	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										

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72772°, W162.46635°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0								Depth in (ft.)	0.5		
	1								Time			
	2								Date			
	3								Symbol	▼		
	4								SUBSURFACE MATERIAL			
	5								ICE			
	6								WATER			
	7								Bk-Bn SILT w/ Sand sl Org			
	8								Bk-Bn Sandy SILT w/ Gravel sl Org, TILL?			
	9								Bk-Bn SILT w/ Sand sl Org, OCC. GRAVEL, TILL?			
	10								BOH			

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11 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





STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 Equipment Type CME 45B Station, Offset \_\_\_\_\_  
 Weather \_\_\_\_\_ Latitude, Longitude N66.72922°, W162.47271°  
 TH Finalized By K. Maxwell Vegetation \_\_\_\_\_ Elevation \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data					Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval	N-Value			While Drilling	After Drilling	
	0									0.5		SUBSURFACE MATERIAL
	1											ICE
	2											
	3											
	4											WATER
	5											
	6											
	7											Bn Poorly-graded SAND w/ Gravel
	8											
	9											
	10											Bk-Bn SILT w/ Sand sl Org
	11											
	12											
	13											
	14											Bk-Bn Sandy SILT w/ Gravel sl Org, TILL?
	15											
	16											Bk-Bn SILT w/ Sand sl Org
	17											
	18											
	19											
	20											
	21											
	22											Bk-Bn Sandy SILT w/ Gravel sl Org, TILL?
	23											
	24											
	25											
	26											Bk-Bn SILT w/ Sand sl Org
	27											
	28											
	29											
	30											
	31											
	32											
	33											
	34											BOH

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING.GPJ NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

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



STATE OF ALASKA DOT/PF  
Northern Region Materials  
Geology Section

# FINAL TEST HOLE LOG

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 \_\_\_\_\_

Drilling Method	Depth in (Feet)	Casing Blows / ft	Sample Data				Frozen	Graphic Log	Ground Water Data		GENERAL COMMENTS:
			Method	Number	Blow Count	Sample Interval			N-Value	While Drilling	
	0							Depth in (ft.)	0.5		
	1							Time			
	2							Date			
	3							Symbol	▼		
	4							SUBSURFACE MATERIAL			
	5							ICE			
	6							WATER			
	7							Bk-Bn SILT w/ Sand sl Org			
	8							SAMPLE 10-4055 (10.0-15.0): ML, 79.5% -200, ORG 3.4%, LL 40, PI 13			
	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										

NR AKDOT TEST HOLE LOG - USCS OFFSHORE DRILLING GP., NR\_AKDOT\_PRECON\_USCS\_06\_28\_07.GDT 11/2/11

S-S Auger

AUGER

10-4055

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

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**APPENDIX D**

**CAPE BLOSSOM LAB RESULTS**

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**STATE OF ALASKA DEPARTMENT OF TRANSPORTATION  
NORTHERN REGION  
LABORATORY TESTING REPORT**

PROJECT NAME: Kotzebue to Cape Blossom Road  
 PROJECT NUMBER: 76884  
 AKSAS NUMBER: K. MAXWELL  
 SAMPLED BY:  
 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						
	#10						
	#16						
Sand	#30		100			100	
	#40		99			99	
	#50		99			99	
	#60		98			99	
	#80		97			97	
	#100		96			93	
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 <sup>1</sup>	Org <sup>1</sup>	Org <sup>1</sup>	sl Org <sup>1</sup>	sl Org <sup>1</sup>		
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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: K. MAXWELL  
 SAMPLED BY: CAPE BLOSSOM  
 MATERIAL SOURCE:

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						
	#10			100			
	#16			99			
Sand	#30			91			
	#40			88			
	#50			84			
	#60			83			
	#80			79			
	#100			78			
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 <sup>1</sup>		Org <sup>1</sup>	Org <sup>1</sup>	sl Org <sup>1</sup>	sl Org <sup>1</sup>	sl Org <sup>1</sup>
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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: K. MAXWELL  
 SAMPLED BY:  
 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
<b>% Passing</b>							
3"							
2"							
1.5"							
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
#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	
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 <sup>1</sup>		sl Org <sup>1</sup>	sl Org <sup>1</sup>	sl Org <sup>1</sup>	
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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: K. MAXWELL  
 SAMPLED BY:  
 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							
Sand							
#16				100	100		
#30		100		99	99		
#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		
Hydro							
0.02				51.2			
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 <sup>1</sup>	sl Org <sup>1</sup>		
GENERAL COMMENTS	Gradation is based on material passing the 3" sieve, according to Alaska Test Method T-7. <sup>1</sup> 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						

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**APPENDIX E**

**SYMBOLS AND DEFINITIONS**

**UNIFIED SOIL CLASSIFICATION SYSTEM**

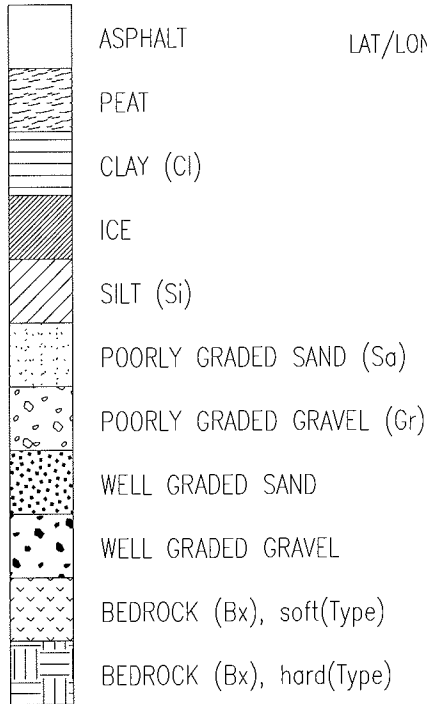
**FROZEN SOIL CLASSIFICATION SYSTEM**

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# SYMBOLS AND DEFINITIONS

## BASIC MATERIAL SYMBOLS



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.

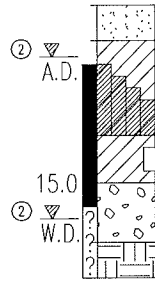
Tr	= TRACE
sl	= SLIGHTLY
hi	= HIGHLY
w/_	= WITH UNSPECIFIED AMOUNT
X'tls	= CRYSTALS
TH	= TEST HOLE
TT	= TEST TRENCH
TP	= TEST PIT

## TYPICAL LOG

YEAR-HOLE NUMBER  
LAT/LONG OR STATION, OFFSET  
ELEVATION (ft)  
DATE LOGGED

05-41  
① Sta 210+53, Lt 3  
Elev 375  
16 JUN

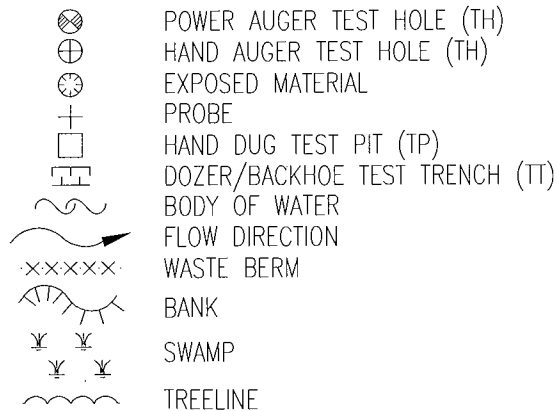
WATER TABLE  
FROZEN  
DEPTH (FEET)  
POSSIBLY FROZEN



24 ③ N VALUE  
~25%  
~50% PERCENT VISIBLE ICE  
~75%  
~100%  
SAMPLE INTERVAL  
STRATA CONTACT  
COBBLE OR BOULDER (FROM AUGER REACTION)  
REFUSAL

- 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



## 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		

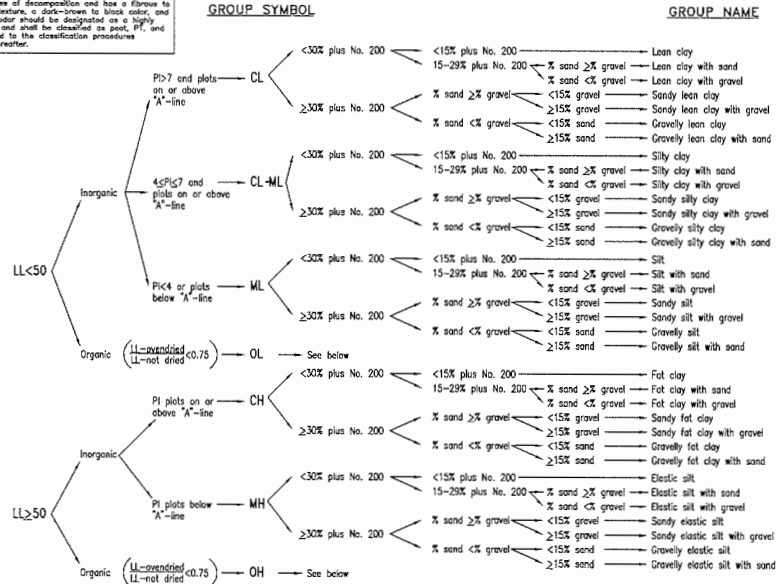
## MOISTURE

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

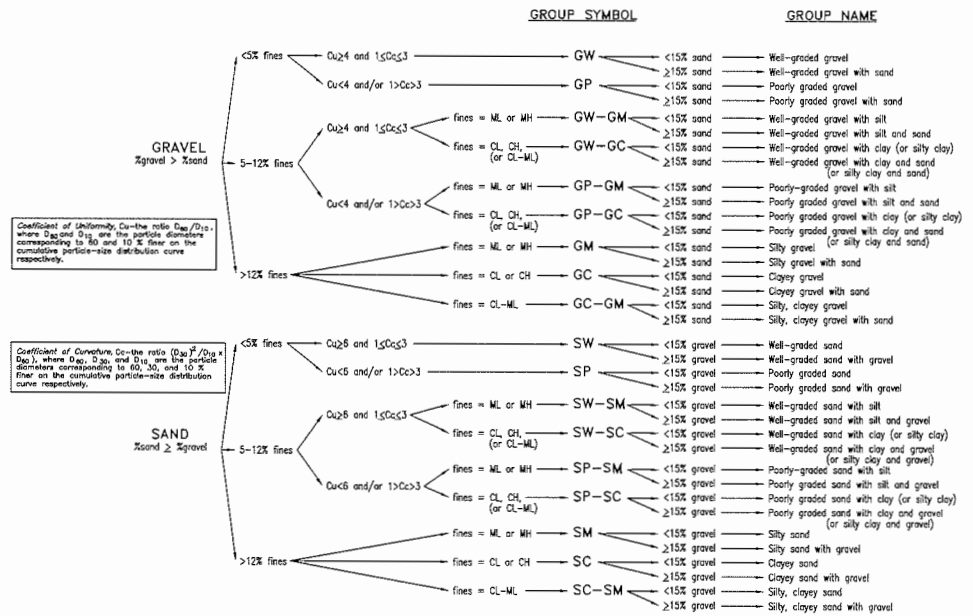
\* OPTIMUM MOISTURE FOR MAXIMUM DENSITY

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

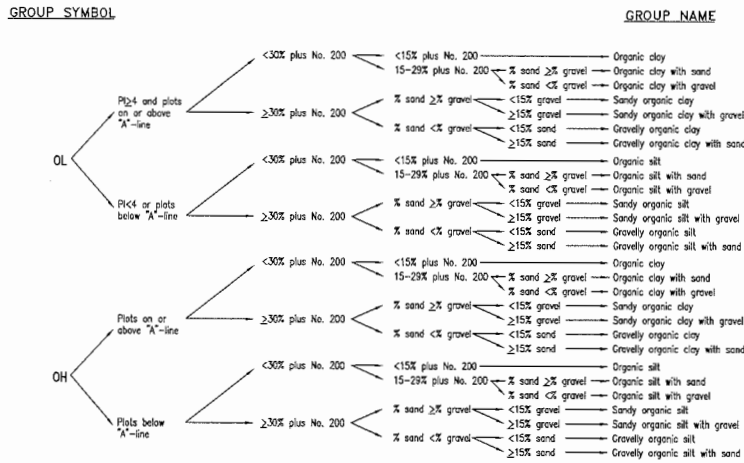
A sample composed primarily of vegetable tissue in various stages of decomposition and has a flammability or smoldering feature, a dark-brown to black color, and an organic odor should be designated as a highly organic soil and shall be classified as peat, Pt, and not subjected to the classification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



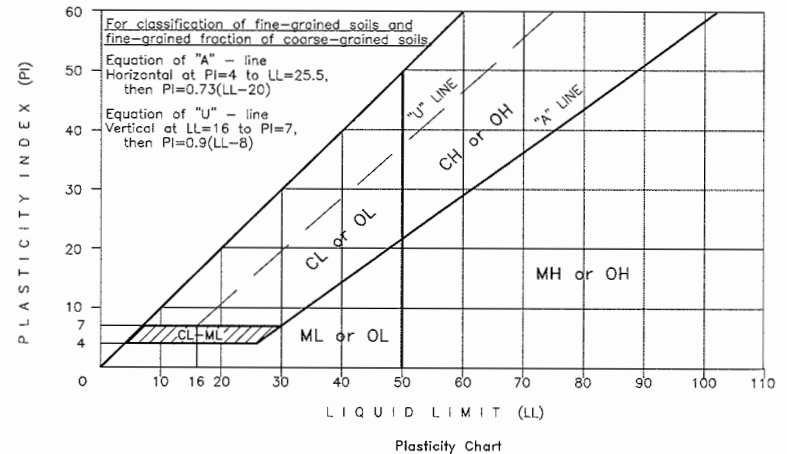
Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)



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



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



# DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS

Part I Description of Soil Phase (a) (Independent of Frozen State)	DESCRIPTION AND CLASSIFICATION OF FROZEN SOILS									
	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 <sub>2</sub> O, 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.		
			No excess ice	n					Well Bonded	Nb
Part III Description of Substantial Ice Strata	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	Same as Part II above, as applicable, with special emphasis on Ice Crystal Structure.	Usually Thaw-Unstable	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.		
			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    Structure    Color    Admixtures Hard        Clear        e.g.:    e.g.: Soft        Cloudy      Color-    Contains Porous      less      Thin Silt Canded    Gray      Inclusions Granular   Blue      ions Stratified	Same as Part II above, as applicable, with special emphasis on Ice Crystal Structure.	Usually Thaw-Unstable	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.		
			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.

**Canded 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.