Central Region Materials
Department of Transportation and Public Facilities

Memorandum State of Alaska

TO:	Harvey Smith, P.E. Statewide Coastal Engineer	**DATE:**	November 10, 2011
		FILE NO:	Mertarvik Waterfront Development #80861
FROM:	Craig Boeckman, CPG CB Regional Geologist Central Region Mtls	**TELEPHONE NO:** **FAX NO:**	269-6200 269-6201

SUBJECT: Field Trip Report- Observations of IRT Work - Rock Quarry Development and Access

I visited Mertarvik on August 15-16, 2011 with Kim Mahoney, PE Sr Project Manager with ADOT&PF Statewide Public Facilities, Sam Lamont SWPP specialist with ADOT&PF Northern Region Materials, and Jennifer Keese an Engineering Geologist I with ADOT&PF Central Region Materials.

We visited the site to observe the work performed that summer by the ANG 202nd Red Horse Team (202nd Red Horse Team). The 202nd Red Horse Team had brought in dozers and an excavator to begin development of the rock quarry on "Hill 460" and they also performed work at the MEC. They had contracted the services of a driller/blaster to shoot the rock at Hill 460. Their driller/blaster was Advanced Blasting Services from Wasilla Alaska.

By the time we arrived on site the 202nd Red Horse Team and their contractor had already left the site. Apparently no information will be provided from 202nd Red Horse Team as to the type of shot or estimated quantities. Therefore I obtained some rudimentary information from Advanced Blasting as to what their procedures were and possible quantities generated (see e-mail attached).

No shot rock was placed on the proposed quarry access road. The rock quarry access road is currently rutted (see Photo Log). Geomats were placed on some of the trail up to the quarry. The quarry itself was shot but none of the material was moved away from the back-wall of the shot. There was no way to evaluate the type of rock at the back of the shot to evaluate the potential for large stone. Apparently the driller/blaster had shot enough area to generate about 100,000 cubic yards of loosened material. (see attached e-mail from the driller/blaster). However it is difficult to be certain of the size of the material shot without it having been moved. Based on observation of the visible shot rock it appears that about 70% is less than 1 ft in size. Perhaps about 10% is greater than 2 ft sized material.

The material is largely tabular due to a series of prominent joint faces with about 2-4 inch spacing (see Photo Log). However some of the rock is rounded perhaps due to the material in the flow solidifying and beginning to roll within the overall mass. The back-wall of the shot that was able to be observed is fractured and the joint spacing along with rounded material can be observed (see Photo Log). The driller said that at about 40 ft (in some of the holes drilled at higher elevation) the rock became very soft, red in color, with occasional water. Apparently they drilled through this layer into some other type material but it is uncertain if it was another basalt flow. The red "rock" was about 4 ft thick. It is very soft and leaves a red streak.

The rock samples collected from the quarry during our site visit were as follows:

GS-1 – Rounded basalt in the shot material
GS-2 – Tabular shaped basalt in the shot material
GS-3 – Red marker layer adjacent to the quarry (original ground?)

The rounded basalt rock had elevated sulfate soundness results (see table below). The jointed basalt rock had very high degradation values and low sulfate values. The table below gives a summary of rock sample results collected from this site.

Summary of rock sample results from "Hill 460".

Sample ID	Sample Date	Sample Type	LA Abrasion (% Loss)	Degradation	Sulfate Soundness (% Loss)	Specific Gravity (SSD)
HS-1	Nov 2008	Hand Sample	33	54	1 (course)	--
HS-2	Nov 2008	Hand Sample	29	67	1 (course)	--
HS-3	Nov 2008	Hand Sample	26	38	1 (course)	--
HS-4	Nov 2008	Hand Sample	15	17	4 (course)	--
TH10-19	Aug 2010	Rock Core from ~4-13 ft	--	37	6 (course)	2.77
TH10-19	Aug 2010	Rock Core from 15.2 to 25.2 ft	--	52	6 (course)	2.83
GS-1	Aug 2011	Shot Rock	--	44	24	2.788
GS-2	Aug 2011	Shot Rock	29	77	2	2.847
GS-3	Aug 2011	Surface	--	--	--	--

Source: R&M Consultants, "*Geotechnical Report Mertarvik Airport Location Study.*." May 6, 2009
R&M Consultants, "*Geotechnical Report- Draft- Mertarvik Airport Location Study.*." Dec 3, 2010
Sample GS-1 to GS-3 were collected by ADOT&PF at the rock quarry in August 2011.

GS-3 was crushed (easily) and analyzed for plastic limits. The rock did not display plastic behavior in the sample we collected (see sample results attached). However the material breaks down very easily. Petrographic analysis was run on the three samples. GS-3 was identified as an oolitic iron mudstone.

Attachments:
Laboratory Results
Photo Log
Maps of "worked" areas
Advanced Blasting Drill and Shoot Summary

Boeckman, Craig T (DOT)

From: Julia Saunders [julia@advancedblastingak.com]
Sent: Wednesday, November 09, 2011 5:31 PM
To: Boeckman, Craig T (DOT)
Subject: Fwd: Re: mertarvik done

-------- Original Message --------
Subject: Re: mertarvik done
Date: Sun, 07 Aug 2011 17:34:00 -0800
From: Julia Saunders <julia@advancedblastingak.com>
Reply-To: julia@advancedblastingak.com
To: Boeckman, Craig T (DOT) <craig.boeckman@alaska.gov>

Hi Craig,
I have noted answers in Red - per Mikel - hope this info is helpful. Hoping to get photo rounded up and burned to disc this week - where should i mail it? Thanks!

On 8/4/2011 9:01 PM, Boeckman, Craig T (DOT) wrote:
Thanks Julia

Questions are:
How many days did you drill and shoot? 10 days double shifting
How much shot? 106,070yd3
How deep did you drill into rock? To establish the pit floor in shot 1, they drilled 16ft avg for bench 1 and then at the top of the quarry they drilled 48ft avg to establish bench 2. Did it get easier to drill at a certain depth? Drilling to establish the pit floor was consistant, drilling to establish the top bench was consistant to a depth of 40ft. At 40ft, a very bright red softer material was encounted in everyhole. Penetration rates increased in the red material and water was occasionally encountered
What was the powder factor? 1.2 lb/yd3 How much powder used? 129,085 lb
How much stemming and burden? 18ft burden, the majority of the holes were loaded to within 2ft of the collar to minimise oversize
How much overburden? Overburden was consistant across the formation at approx. 4ft consisting of a thin layer of organics over a mixture of hard clay and what appeared to be ash combined with loose cobbly rocks 1ft and smaller. Perfrost was encountered in some regions at a depth of 2.5ft
What pattern was used? 18ft x 18ft avg. Bit sizes ranging from 5" - 6 3/4"
What kind of material was made? 6"minus, fragmentation was very consustant
Any large rock generated? Some isolated zones near the back corners of both shots generated material in the 2-3ft range indicating that this source would produce slope protection if the blasting program was modifed to target it's production.
How did the rock look in the back wall? Visual inspection of the backwall was possible as the material broke vertical and approx. 15ft of high wall was exposed. Although the material drilled consistantly, visual inspection of the backwall indicates it is actually large boulders bedded in a softer material rather than a solid rock mass.
Wide fracture spacing or fractured rock? At the powder factor used, the material broke very fine. At considerable lower powder factors large material up to 3ft could easily be produced.
Was there gaps in the rock like Chefornak (flows)? yes, to a far lesser extent. The formation drilled loaded and shot considerably better.
How'd the IRT operate with your crew? A ahtna representative was on site for the duration and handled projection cooridination with the customer. We received very good mechanical support, fuel delivery, stripping and access maintaince from the miltary crew. We were impressed by there eagerness to learn and there talent with the overburden stripping.
How is placement of the material going on the access road? Material was not placed on the access road due to the tight timeframe

How did the access road look? Roughly 1/2 of the access road was matted and performed very well, the remaining portion held up to low ground pressure vehicle better than we had expected.
Did they cut into permafrost making the road? No they did not, the portion that was un matted was left in it's nature state becasue the vegatiative mats provided support for small vehicle traffic.

Might have more later.
All photos would be great.
Thanks
Craig

From: Julia Saunders [mailto:julia@advancedblastingak.com]
Sent: Thu 8/4/2011 11:29 AM
To: Boeckman, Craig T (DOT)
Subject: mertarvik done

Hi Craig,
Mertarvik is complete. All went well. The crew will be back tomorrow. I will try and get some photo roundup up from them with a bit of a write up for you and over first part of next week. Feel free to email specific questions so i can quiz the guys accordingly! Thanks,

--
Julia Saunders
Advanced Blasting Services
1830 E. Parks Hwy, Ste A113
610, Wasilla, AK 99654
Tel: (907) 357-2900
Fax: (907) 357-2930
Email: julia@advancedblastingak.com
www.advancedblastingak.com

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State of Alaska
Department of Transportation & Public Facilities
Central Materials Lab
5750 East Tudor Road
Anchorage, AK 99507
Phone (907) 269-6200 FAX (907) 269-6201

Laboratory Report

Preconstruction

Laboratory No.: **2011A-2908**

Name: **Mertarvik Waterfront Development Study** Project No.: **80861**
Sample: **Rock** Item/Specification No.:
Sampled From: **Quarry, Depth Surface** Field No.: **GS2**
Source: **Material Site Hill 460** Quantity Represented:
Location: Submitted By: **C. Boeckman**
Examined For: **Degradation, Sulfate Soundness and SpG**

Date Sampled: **08/15/2011**
Date Received: **08/24/2011**
Date Completed: **09/13/2011**
Date Reported: **09/13/2011**

Sieve Analysis	Lab	Specs
4"		
3"		
2"		
1 1/2"		
1"		
3/4"		
1/2"		
3/8"		
1/4"		
#4		
#8		
#10		
#16		
#30		
#40		
#50		
#80		
#100		
#200		
.02 mm		
.002 mm		
Fineness Modulus		

		Lab	Specs
	% Organic		
	% Natural Moisture		
	pH of Soil		
	% Sticks & Roots		
	Dry Unit Weight, pcf		
	% Lightweight Particles		
	Uncompacted Voids of FA		
	Specific Gravity of Soil		
	Sand Equivalent		
ATM T314	Expansion Breakdown	5	

		Coarse		Fine	
		Lab	Specs	Lab	Specs
	Friable Particles				
AASHTO T104	Sulfate Soundness, % Loss	2			
	Agg. Specific Gravity, Bulk	2.802			
	Agg. Specific Gravity, SSD	2.847			
AASHTO T85	Agg. Specific Gravity, App.	2.935			
	% Absorption	1.6			
AASHTO T96	LA Abrasion, Total % Loss	29			
	@ 100 revs % Loss				
ATM 313	Degradation	77			
	Nordic Abrasion				

% Fracture	FSV Class	% +3"
Single Face	AASHTO Class	% Gravel
Double Face	Unified Class	% Sand
		% Silt/Clay
Atterburg Limits		% Clay
Liquid Limit		
Plastic Limit	California Bearing Ratio	
Plastic Index	Organic Impurities Plate #3	
	Mortar Making Properties of Sand - Compressive Strength	
Flat / Elongated	Age Sample Control Ratio Spec	
1:3	7 Day	
1:5	28 Day	

Remarks:

D2 The Material as Submitted Conforms to Specifications
Yes [ ] No [ ] NA [X]

THE TEST RESULTS ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

Signature: Newton Bingham

Newton J. Bingham, PE
Regional Materials Engineer

State of Alaska
Department of Transportation & Public Facilities
Central Materials Lab

5750 East Tudor Road
Anchorage, AK 99507
Phone (907) 269-6200 FAX (907) 269-6201

Laboratory Report

Preconstruction

Laboratory No.: ***2011A-2907***

Name: ***Mertarvik Waterfront Development Study*** Project No.: ***80861***
Sample: ***Rock*** Item/Specification No.: Field No.: ***GS1***
Sampled From: ***Quarry, Depth Surface*** Date Sampled: ***08/15/2011***
Source: ***Material Site Hill 460*** Quantity Represented: Date Received: ***08/24/2011***
Location: Submitted By: ***C. Boeckman*** Date Completed: ***08/31/2011***
Examined For: ***Degradation, Sulfatae Soundness and SpG*** Date Reported: ***08/31/2011***

	Lab	Specs
Sieve Analysis		
4"		
3"		
2"		
1 1/2"		
1"		
3/4"		
1/2"		
3/8"		
1/4"		
#4		
#8		
#10		
#16		
#30		
#40		
#50		
#80		
#100		
#200		
.02 mm		
.002 mm		
Fineness Modulus		
% Fracture		
Single Face		
Double Face		
Atterburg Limits		
Liquid Limit		
Plastic Limit		
Plastic Index		
Flat / Elongated		
1:3		
1:5		

		Lab	Specs
	% Organic		
	% Natural Moisture		
	pH of Soil		
	% Sticks & Roots		
	Dry Unit Weight, pcf		
	% Lightweight Particles		
	Uncompacted Voids of FA		
	Specific Gravity of Soil		
	Sand Equivalent		
	Expansion Breakdown		

		Coarse		Fine	
		Lab	Specs	Lab	Specs
	Friable Particles				
AASHTO T104	Sulfate Soundness, % Loss	24			
	Agg. Specific Gravity, Bulk	2.724			
	Agg. Specific Gravity, SSD	2.788			
AASHTO T85	Agg. Specific Gravity, App.	2.912			
	% Absorption	2.4			
	LA Abrasion, Total % Loss				
	@ 100 revs % Loss				
ATM 313	Degradation	44			
	Nordic Abrasion				

FSV Class	% +3"
AASHTO Class	% Gravel
Unified Class	% Sand
	% Silt/Clay
	% Clay

California Bearing Ratio

Organic Impurities Plate #3

Mortar Making Properties of Sand - Compressive Strength

Age	Sample	Control	Ratio	Spec
7 Day				
28 Day				

Remarks:

D2 The Material as Submitted Conforms to Specifications
Yes [ ] No [ ] NA [X]

THE TEST RESULTS ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

Signature: Newton Bingham

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Laboratory Report

Preconstruction

Laboratory No.: ***2011A-3023***

Name: ***Mertarvik Waterfront Development Study*** Project No.: ***80861***
Sample: ***Silt Stone*** Item/Specification No.: Field No.: ***GS3***
Sampled From: ***Quarry*** Date Sampled: ***08/15/2011***
Source: ***Material Site Hill 460*** Quantity Represented: Date Received: ***09/06/2011***
Location: Submitted By: ***C. Boeckman*** Date Completed: ***09/13/2011***
Examined For: ***Atterberg Limits*** Date Reported: ***09/13/2011***

Sieve Analysis	Lab	Specs
4"		
3"		
2"		
1 1/2"		
1"		
3/4"		
1/2"		
3/8"		
1/4"		
#4		
#8		
#10		
#16		
#30		
#40		
#50		
#80		
#100		
#200		
.02 mm		
.002 mm		
Fineness Modulus		

% Fracture		
Single Face		
Double Face		

Atterburg Limits	Dry Prep AASHTO T89 & T90	
Liquid Limit	NV	
Plastic Limit	NV	
Plastic Index	NP	

Flat / Elongated		
1:3		
1:5		

Sample Preparation by: AASHTO R58 & T248

	Lab	Specs
% Organic		
% Natural Moisture		
pH of Soil		
% Sticks & Roots		
Dry Unit Weight, pcf		
% Lightweight Particles		
Uncompacted Voids of FA		
Specific Gravity of Soil		
Sand Equivalent		
Expansion Breakdown		

	Coarse		Fine	
	Lab	Specs	Lab	Specs
Friable Particles				
Sulfate Soundness, % Loss				
Agg. Specific Gravity, Bulk				
Agg. Specific Gravity, SSD				
Agg. Specific Gravity, App.				
% Absorption				
LA Abrasion, Total % Loss				
@ 100 revs % Loss				
Degradation				
Nordic Abrasion				

FSV Class	% +3"
AASHTO Class	% Gravel
Unified Class	% Sand
	% Silt/Clay
	% Clay

California Bearing Ratio

Organic Impurities Plate #3

Mortar Making Properties of Sand - Compressive Strength

Age	Sample	Control	Ratio	Spec
7 Day				
28 Day				

Remarks:

D2 The Material as Submitted Conforms to Specifications
Yes [ ] No [ ] NA [X]

THE TEST RESULTS ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

Signature: Newton Bingham

Newton J. Bingham, PE
Regional Materials Engineer

PETROGRAPHIC ANALYSIS REPORT

Client: State of Alaska DOT&PF

Thin Section ID: GS-1 (orig. GS-2)

Project: #12-35-1019 Mertarvik

Field Classification: Med. greenish-gray, moderately altered olivine basalt.

COMPOSITION:

Constituent	Optical/Physical Properties	Estimated %

Plagioclase (An_{44} - Andesine) – Randomly-oriented twinned laths ≤1mm long, averaging ~0.5mm; moderate relief (> quartz reflects higher An content). Some flow texture is apparent around the olivine/mafic phenocrysts. Plagioclase is essentially unaltered. **50%**

Olivine – Small fractured phenocrysts (≤1mm) are characterized by corroded polygonal outlines with alteration (chlorophaeite?) emphasizing rims and internal fractures. The high-relief grains, colorless in plane light, display typical strong (upper 2nd order) interference colors under x-nicols. **10%**

Clinopyroxene (Augite) – Occurs in this section as interstitial granules (~.05mm) in the matrix grading up to subhedral grains (~0.6mm) that subophitically enclose the plagioclase in some places. The moderately high relief pyroxene grains are neutral-colored in plane light, and display low (1st order to lower 2nd order) interference colors, angular extinction and some twinning. **25%**

Opaques (Magnetite) – Reflect black in incident light; occur as individual polygonal and irregular-shaped grains (i.e. fillings for interstices) and the occasional filled microfracture. **5%**

Chlorite/Chlorophaeite – The latter term is defined as "a green or brown chloritic alteration of olivine" that, in this specimen, has a granular to fibrous habit and often displays a colloform structure. It is reddish-brown to deep olive green here. **9%**

Calcite – Fills amygdules lined with chlorite/chlorophaeite (≤1.0 mm in diameter), and is also found as an irregular patch ~1.2 mm across. **<1%**

TEXTURES AND STRUCTURES

Grain Size: Range in size from 1mm (plagioclase & olivine) down to <0.015mm (magnetite).

Textures: Igneous volcanic, intergranular texture with some subophitic texture in places.

Structures: A couple of healed (with magnetite) microfractures are present, and one open fracture traverses the slide. Several round amygdules are rimmed with colloform "chlorophaeite", then filled with calcite. A few vesicles are also present.

Alteration: Olivine is moderately altered (deuterically) to chlorite/chlorophaeite, and later calcite filled some vesicles.

PETROGRAPHIC CLASSIFICATION: Olivine Basalt

PETROGENESIS: Lava flow was deuterically altered during cooling, with later calcite filling some chlorophaeite-lined amygdules

COMMENTS:

Carolyn C. N. Stevens — Petrographer

11/8/2011 — Date

PETROGRAPHIC ANALYSIS REPORT

Client: State of Alaska DOT&PF

Thin Section ID: GS-2 (orig. GS-1)

Project: #12-35-1019 Mertarvik

Field Classification: Mod. fine-grained med. gray basalt with slightly altered olivine

COMPOSITION:

Constituent	Optical/Physical Properties	Estimated %

Plagioclase (An_{48-62}-Andesine/Labradorite) – Occurs here as unaltered, slender twinned laths (≤1mm long, ranging down to ~0.15mm) in random orientation. **45%**

Clinopyroxene (Augite) – High relief, neutral-colored subhedral to anhedral grains (plane light), with typical pyroxene cleavage and 1st to middle 2nd order birefringence (x-nicols), some twinning, and ~40° extinction angle in sections with maximum birefringence. Grains are unaltered and range in length from 1mm down to <0.15mm. **25%**

Olivine – High relief, rounded (usually anhedral) grains with poor cleavage and irregular, often curved internal fractures and strong upper 2nd order birefringence. Grain rims, internal fractures and cleavage are emphasized by alteration to **iddingsite**, a reddish-brown mineral with lamellar structure. Grains range from 2.3mm (max) down to 0.06mm. **12%**

Opaques: Include **Magnetite** (black-reflecting, anhedral patches filling some interstices; up to ~0.6 mm long) and possible **Chromite** (brown in reflected light with brown semi-opaque edges on the anhedral grains. Some or most of these grains may also be totally altered olivine. Max diameter ~0.18mm.) **8%**

Pores/Interstices – Angular spaces, homogeneously distributed throughout the specimen, range in size from 0.45mm down to <0.05mm. (Blue epoxy impregnation aided in estimating amount of pore space.) **10%**

TEXTURES AND STRUCTURES

Grain Size: Grains range in size from 2.3mm down to 0.06mm.

Textures: Igneous volcanic, intergranular, diktytaxitic texture. ("Diktytaxitic" texture is defined as a volcanic igneous texture characterized by numerous jagged, irregular vesicles bounded by crystals, some of which protrude into the cavitities." AGI *Glossary of Geology, 5th Edition*, page 180.)

Structures: None noted.

Alteration: A fresh rock, with only the olivine slightly altered (deuterically) to iddingsite.

PETROGRAPHIC CLASSIFICATION: Olivine Basalt

PETROGENESIS: Originally a lava flow that was subjected to slight deuteric alteration during cooling. This specimen was probably take from near the surface of the cooled flow.

Carolyn C.H. Stevens — Petrographer

11/8/2011 — Date

PETROGRAPHIC ANALYSIS REPORT

Client: State of Alaska DOT&PF

Thin Section ID: GS-3

Project: #12-35-1019 Mertarvik

Field Classification: Friable, earthy, reddish brown baked volcanic soil(?)

COMPOSITION:

Constituent	Optical/Physical Properties	Estimated %

Fe Oxide/Limonite(?) – Most of this specimen, under x-nicols, is isotropic--dark translucent red, and black (opaque). Plane light best displays the textural features. Under x-nicols, only the rare small quartz grains, one pyroxene(?) grain, plus the thin edges of both grains and matrix impinging upon pore space display anisotropism. The dark blood-red and opaque Fe-oxide/limonite content constitutes the majority of this slide. **65%**

Clasts: Spheroids/"Oolites" & Lithic Fragments – Particles in this specimen are almost all spherical, ovoid or rounded, and range in diameter from <0.05 to ~6mm, perhaps averaging ~0.2mm in diameter. Lithic fragments (when recognizeable) are relatively larger (1.5mm-6mm), subrounded and display volcanic textures. Some of the spheroidal particles have concentric rings internally. While most of the particles are translucent to semi-opaque, many are opaque. Occasional (non-spherical, non-limonitic) clasts/patches (≤0.20mm) appear to be clay (kaolinite?). One clast (~1mm long) appears to be orthopyroxene (1st order gray birefringence, parallel extinction).

Matrix – Consists of lighter reddish-brown limonite clay (kaolinite + fine-grained limonite?) that is isotropic under x-nicols except for thin birefringent edges. A little chamosite may even be present in one patch that is greenish in plane light. **22%**

Quartz – Occurs here as small, mostly angular to subround grains or shards, ≤0.25mm in diameter. **<1%**

Porosity – Due to natural pore space, desiccation cracks and abundant open microfractures, this specimen is quite porous and friable. **12%**

TEXTURES AND STRUCTURES

Grain Size: 6mm (volcanic clast) ranging down to <0.05mm (silt or clay) in matrix.

Textures: Clastic, volcanic, with spheroidal/"oolitic" grains rather common.

Structures: Open microfractures and desiccation cracks are common, making this a friable, crumbly specimen.

Alteration: Weathering of iron-bearing minerals resulted in hydration + oxidation = Fe Oxides.

PETROGRAPHIC CLASSIFICATION: Oolitic Iron "Mudstone"

PETROGENESIS: Iron-rich material weathered from igneous/volcanic terrane was deposited in a shallow sedimentary basin where waves and currents were active. The iron-rich sediments were then thoroughly oxidized—possibly through baking by an overlying flow—before induration.

COMMENTS: Field relationships are necessary to determine the origin of this "rock".

Carolyn C.N. Stevens 11/8/2011

Petrographer Date

MEC Access Road

Barge Landing

Disturbed Tundra
From August 2011 Trip
5.35 Acres

Gravel Pad
From August 2011 Trip

US Air Guard Proposed Equipment
Access Road, about 1.5 Miles.

Existing Access Road
From August 2011 Trip
Total Disturbed Area Excluding
Road In Material Site: 6.24 Acres

Existing Drill Trail

Overall Material Site Permit Area
Total Disturbed Area: 10.46 Acres

Pushed Rock Area
August 2011

Active Material Site
Area - August 2011

700' x 400'
Staging Area

HS-01
HS-02
HS-03
HS-04

TH08-05
TH08-06
TH08-07
TH08-08
TH08-09
TH08-10
TH08-18
TH08-19
TH08-20
TH08-21
TH08-22
TH08-23
TH08-24
TH08-25
TH08-26
TH08-27
TH08-28
TH08-29
TH08-30
TH08-31
TH08-32
TH08-33

R&M TH - 2008

Hand Sample

Test Hole

Newtok Airport Relocation
Material Site Boundaries

Map Created by
CR Materials
August 2011

N

0 500 1,000 2,000 3,000

Feet

Imagery from Aero-Metric 2006
All test hole locations are approximate
Disturbed Area Calculations are Approximate

Figure 1
Newtok Airport Relocation
Material Site Access Road

Map Created by
CR Materials
August 2011

N

0 125 250 500 750

Feet

Imagery from Aero-Metric 2006
All test hole locations are approximate
Disturbed Area Calculations are Approximate

Proposed Access Road

Mapped Access Road August 2011

Disturbed Tundra From August 2011 Trip 5.35 Acres

MEC Access Road

Well

Barge Landing Area

Gravel Pad From August 2011 Trip

Material Site Access Road

Approximately 70' wide

Existing Drill Trail

Matchline

This mapping (and Orthophoto if applicable) was prepared by the Interior Rivers R C & D Council in cooperation with the Alaska Department of Commerce, Community, and Economic Development, Division of Community Advocacy, using funds provided by the Bureau of Indian Affairs. The original AutoCAD drawing or orthophoto has been revised or added to as described

Figure 2
Newtok Airport Relocation
Material Site Access Road

Map Created by
CR Materials
August 2011

N

0 125 250 500 750

Feet

Imagery from Aero-Metric 2006
All test hole locations are approximate
Disturbed Area Calculations are Approximate

Proposed Access Road

Mapped Access Road August 2011

Material Site Access Road

Approximately 50' wide

Matchline

Well

Water Well Service Road

Matchline

This mapping (and Orthophoto if applicable) was prepared by the Interior Rivers R C & D Council in cooperation with the Alaska Department of Commerce, Community, and Economic Development, Division of Community Advocacy, using funds provided by the Bureau of Indian Affairs. The original AutoCAD drawing or orthophoto has been revised or added to as described

Figure 3
Newtok Airport Relocation
Material Site Access Road

Map Created by
CR Materials
August 2011

N

0 125 250 500 750

Feet

Imagery from Aero-Metric 2006
All test hole locations are approximate
Disturbed Area Calculations are Approximate

Proposed Access Road

Mapped Access Road August 2011

Material Site Access Road

Matchline

Matchline

Material Site Access Road
Total Disturbed Area: 6.24 Acres

Base mapping (and Orthophoto if applicable) was prepared by the Lower Kuskokwim Rivers R C & D Council in cooperation with the Alaska Department of Commerce, Community, and Economic Development, Division of Community Advocacy, using funds provided by the Bureau of Indian Affairs. The original AutoCAD drawing or orthophoto has been revised or added to as described

Matchline

Material Site Access Road
Total Disturbed Area: 6.24 Acres

700' x 400'
Staging Area

Overall Material Site Permit Area
Total Disturbed Area: 10.46 Acres

Approximately 70' wide

Pushed Rock Area
August 2011

Active Material Site
Area - August 2011

HS-02

HS-01

HS-03

TH08-26

TH08-29

TH08-28

TH08-27

TH08-33

TH08-32

TH08-31

Proposed Access Road

Mapped Access Road
August 2011

Figure 4
Newtok Airport Relocation
Material Site Access Road

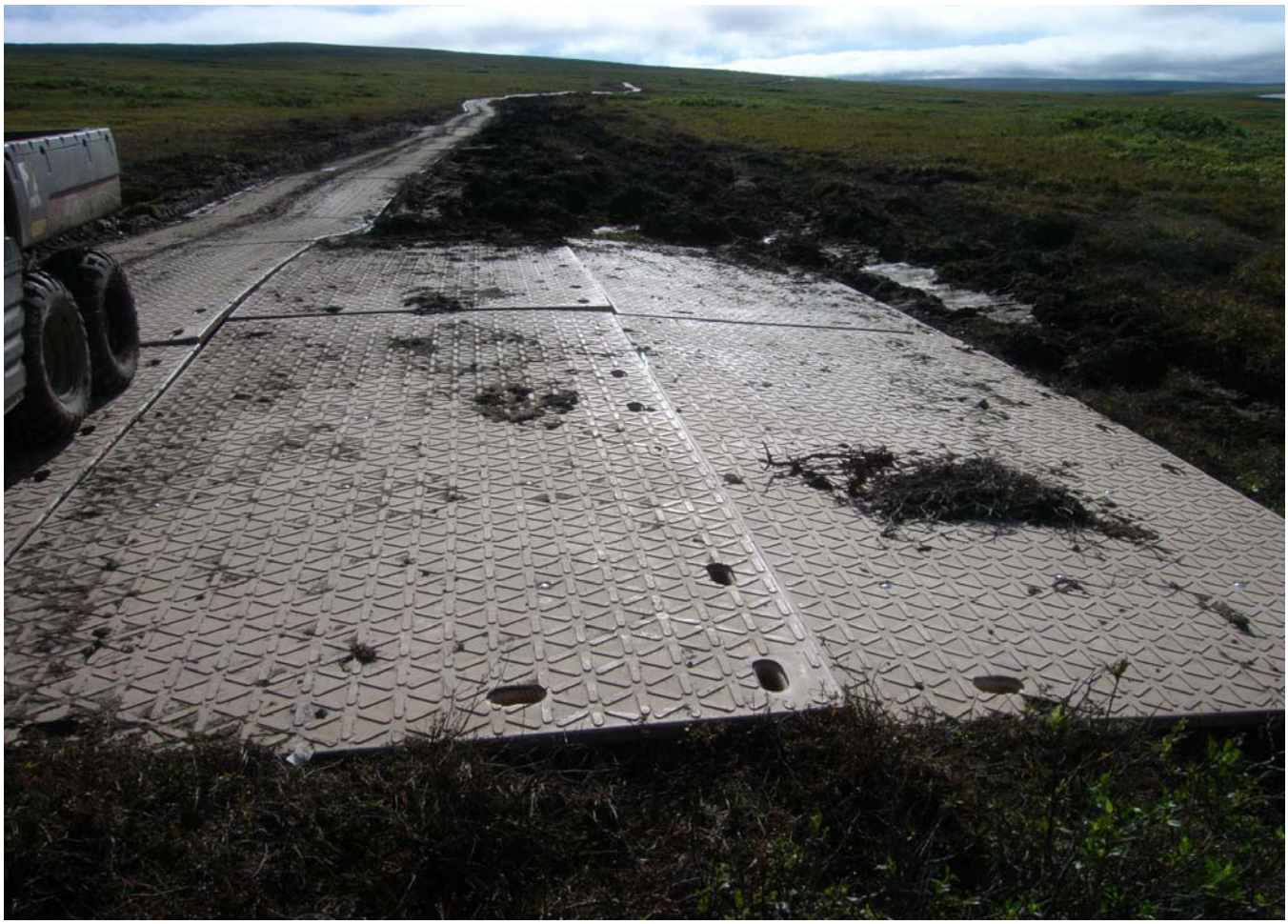
Map Created by
CR Materials
August 2011

N

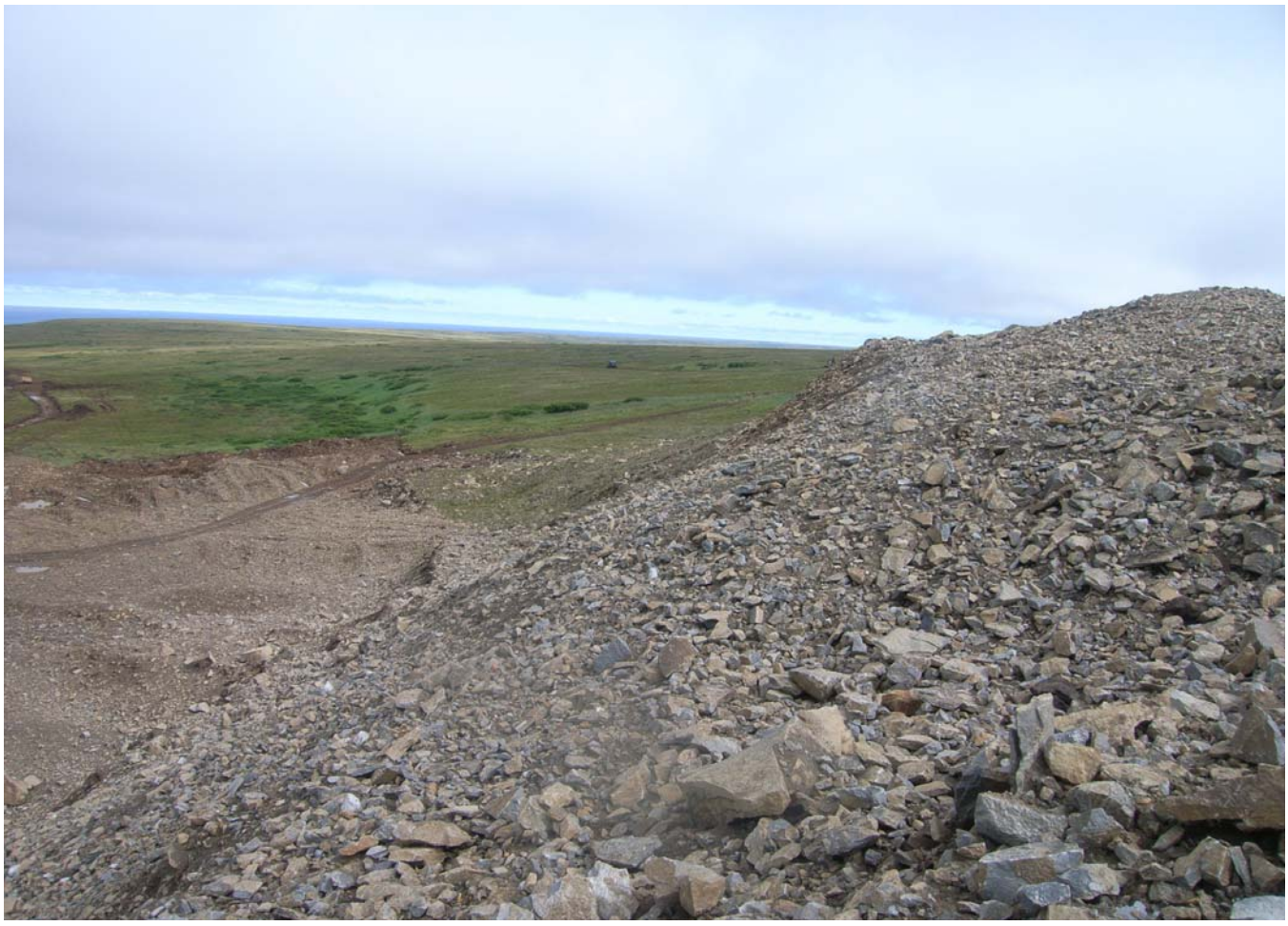
0 125 250 500 750
Feet

Imagery from Aero-Metric 2006
All test hole locations are approximate
Disturbed Area Calculations are Approximate

This mapping (and Orthophoto if applicable) was prepared by the Interior Rivers R C & D Council in cooperation with the Alaska Department of Commerce, Community, and Economic Development, Division of Community Advocacy, using funds provided by the Bureau of Indian Affairs. The original AutoCAD drawing or orthophoto has been revised or added to as described

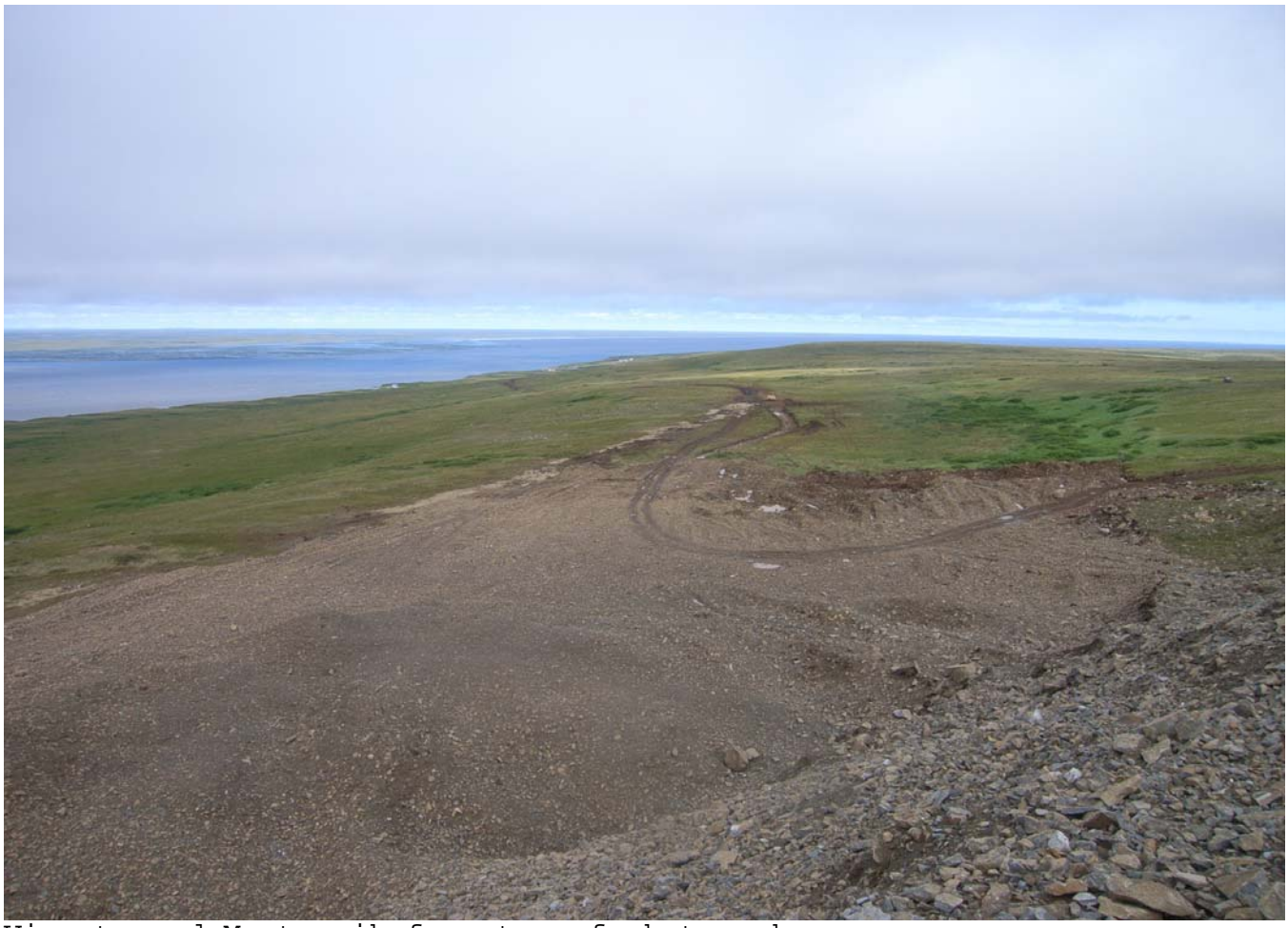


GeoMats near base camp



Shot rock at quarry

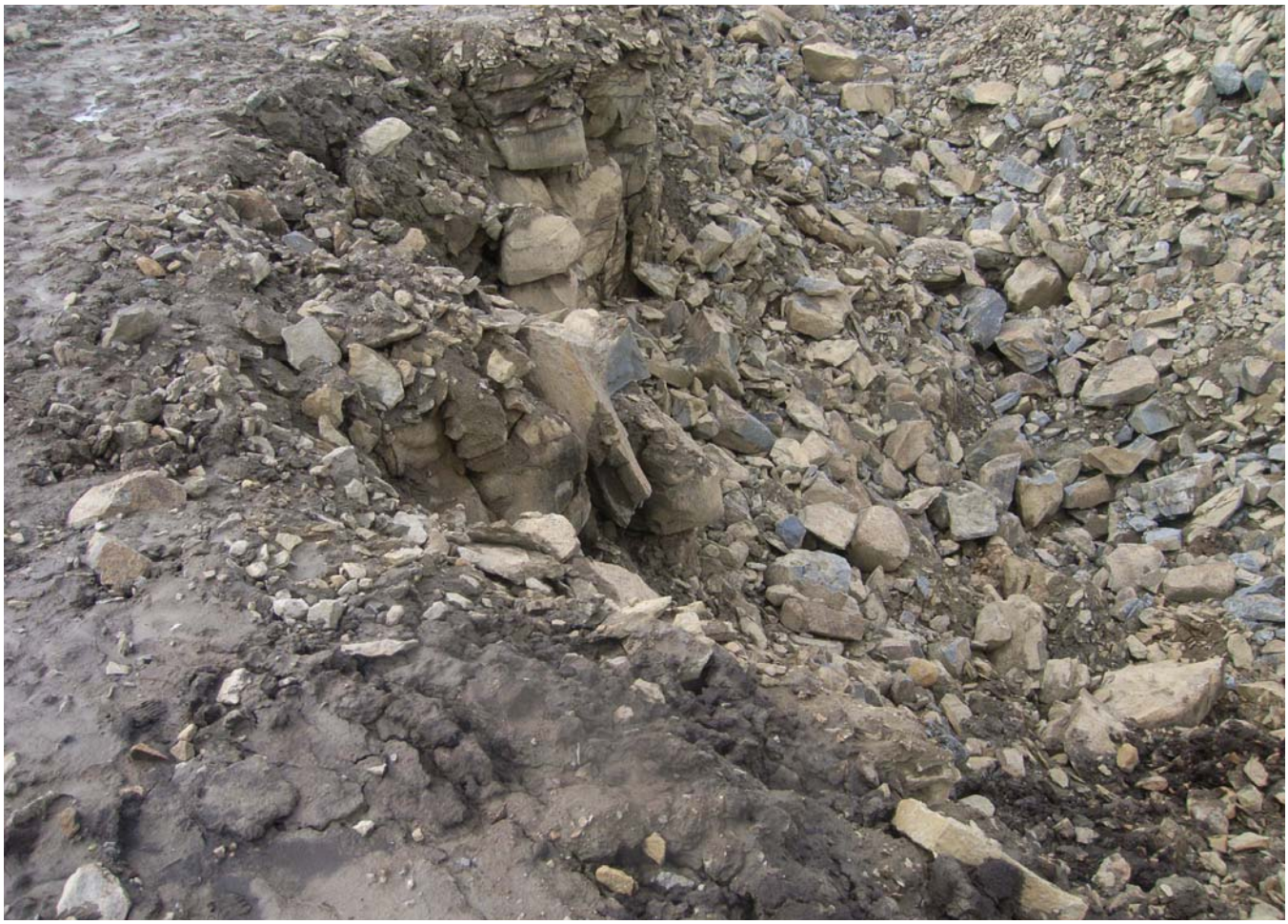
PHOTO LOG



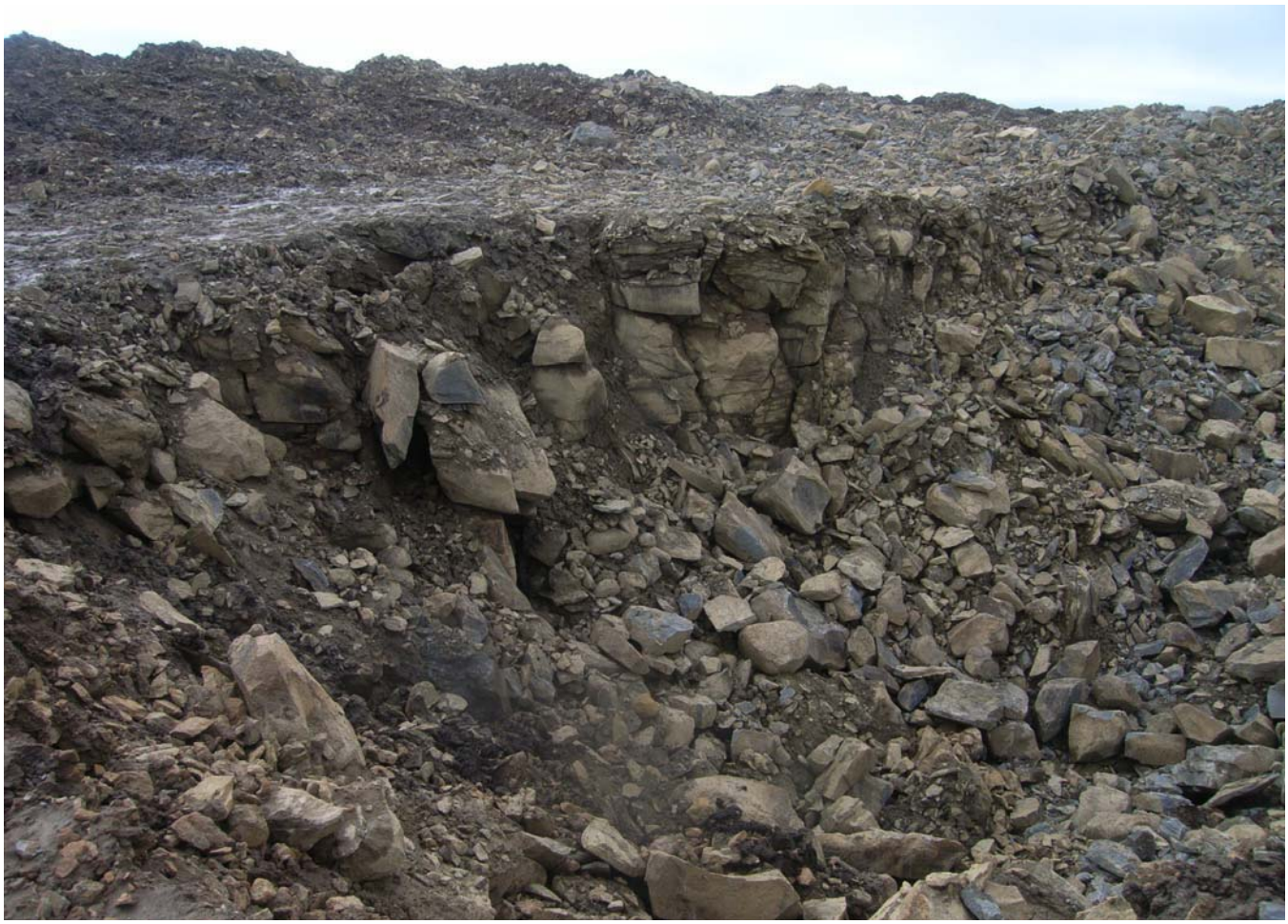
View toward Mertarvik from top of shot rock

Shot rock at quarry

PHOTO LOG



Backwall of shot area



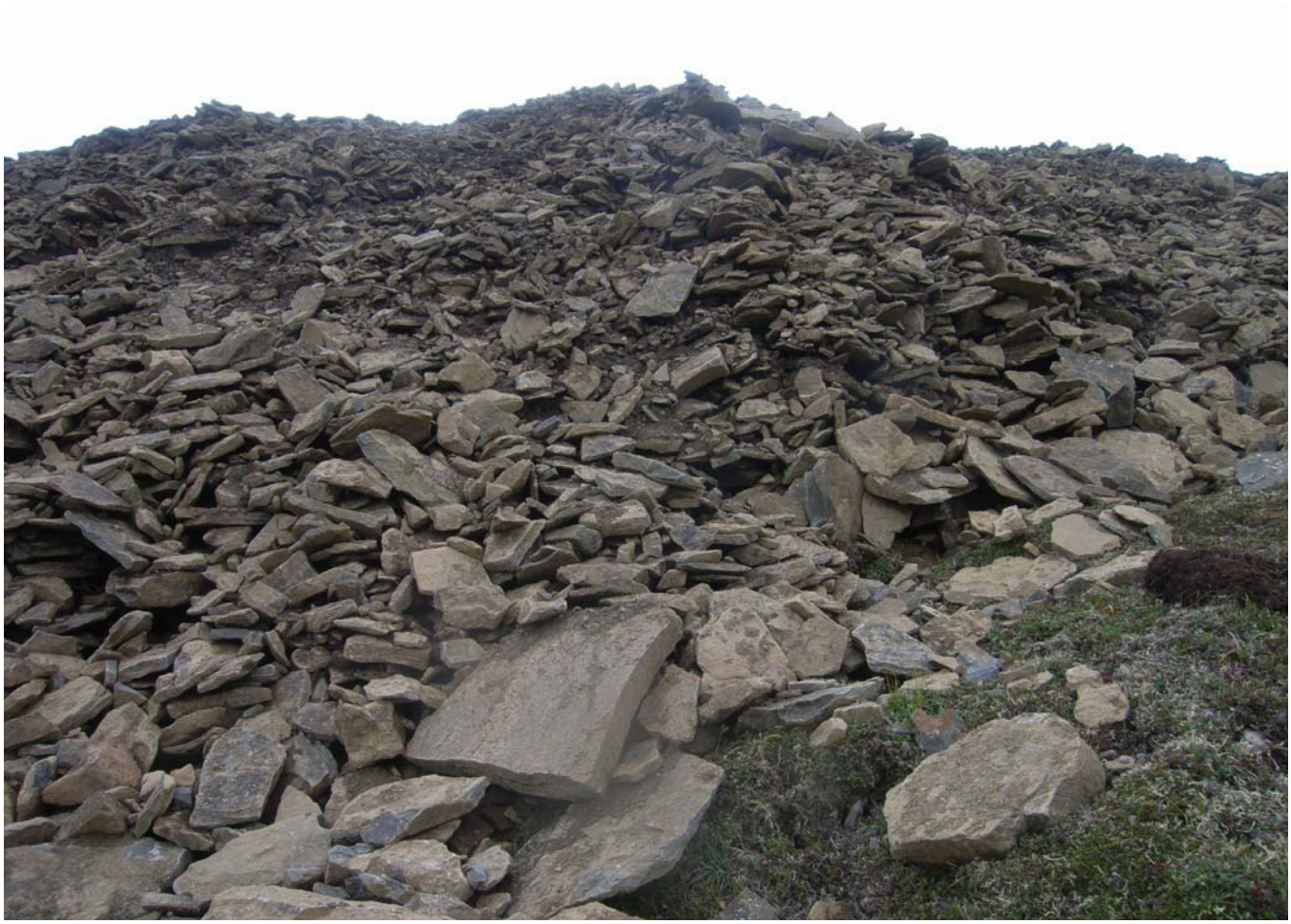
Backwall of shot area at the rock quarry

PHOTO LOG

Shot rock (tabular)

Bedrock with 2-4 inch spaced joint sets

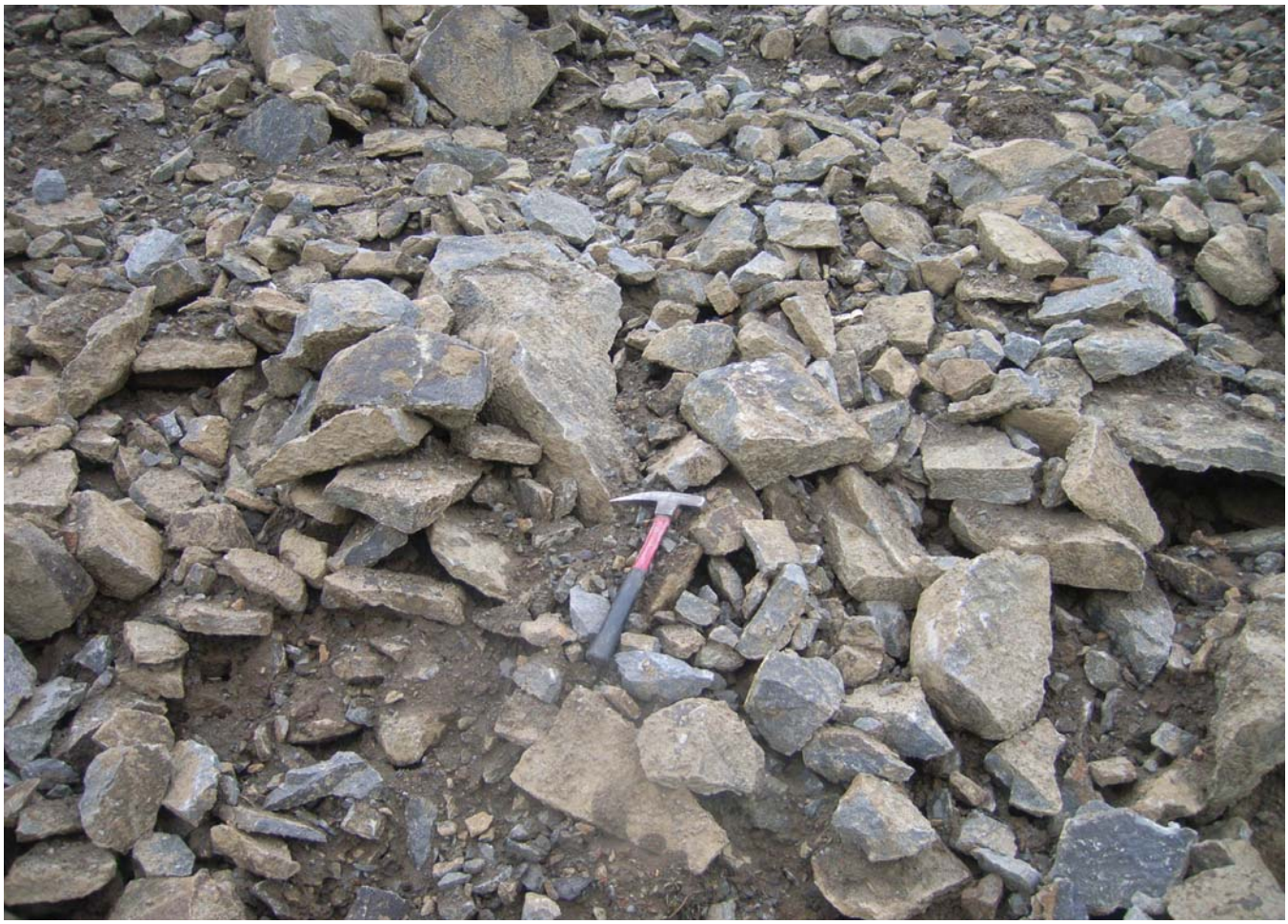
PHOTO LOG



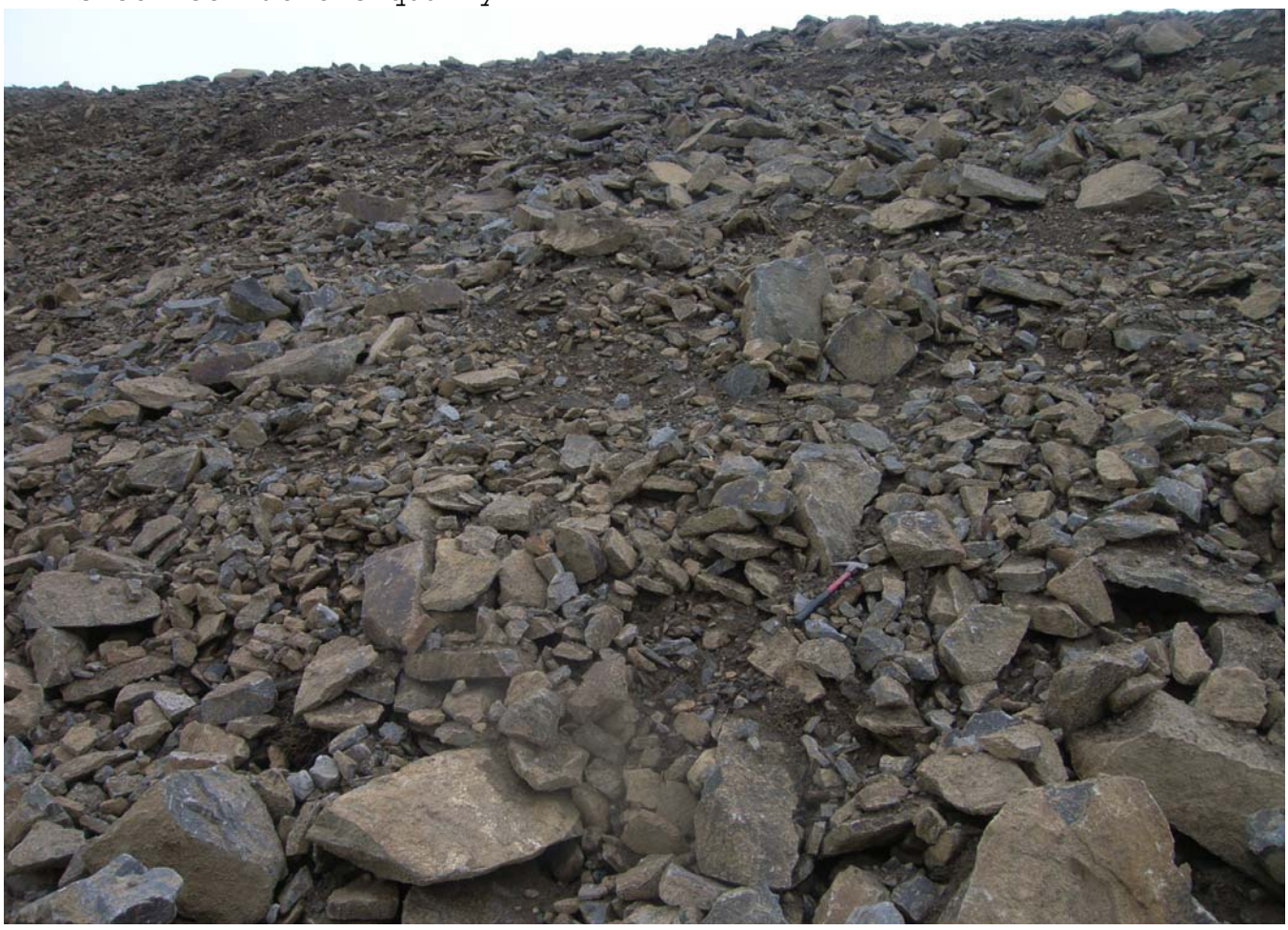
Shot rock at the quarry

Shot rock at quarry

PHOTO LOG

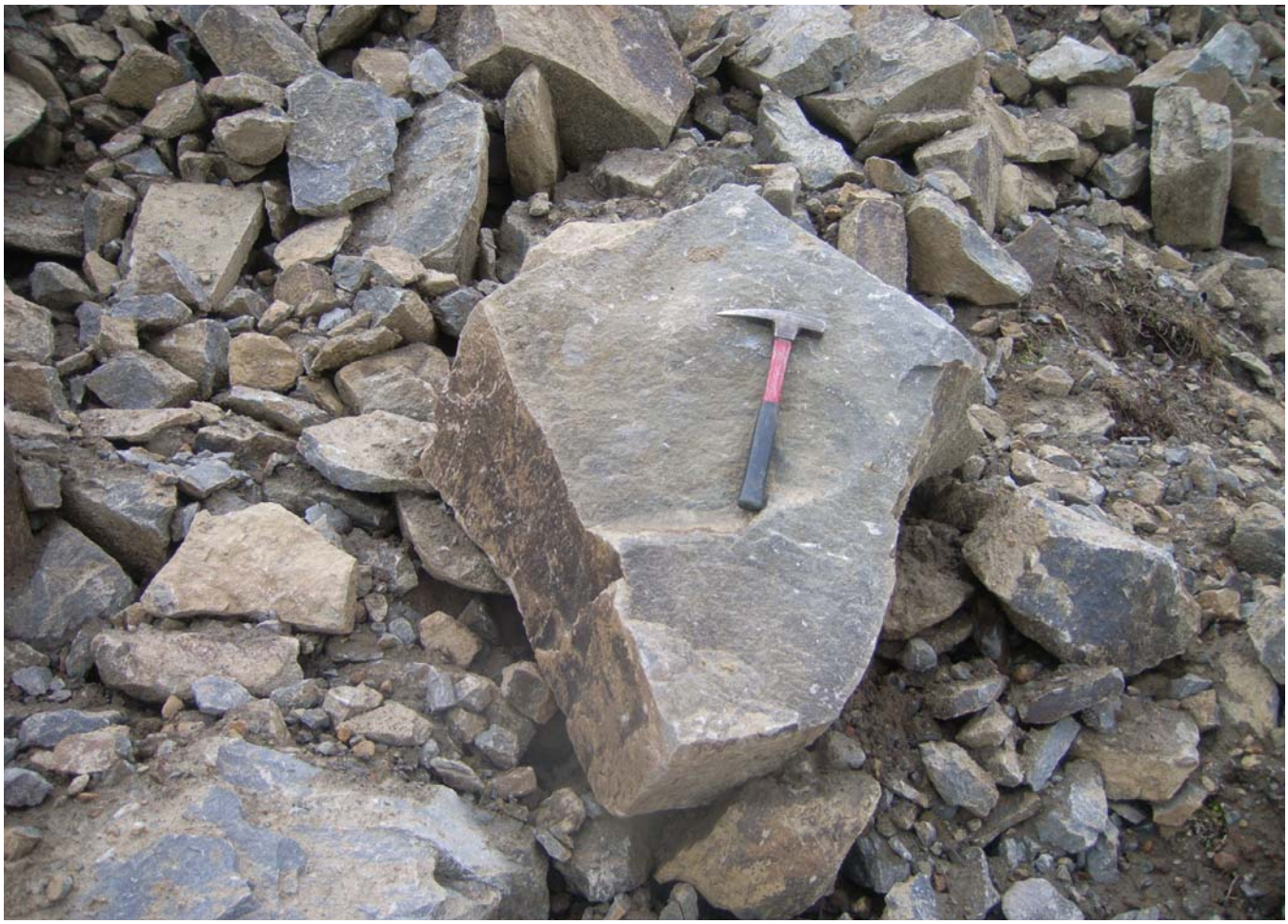


Shot rock at the quarry



Shot rock at quarry

PHOTO LOG



Shot rock at the quarry

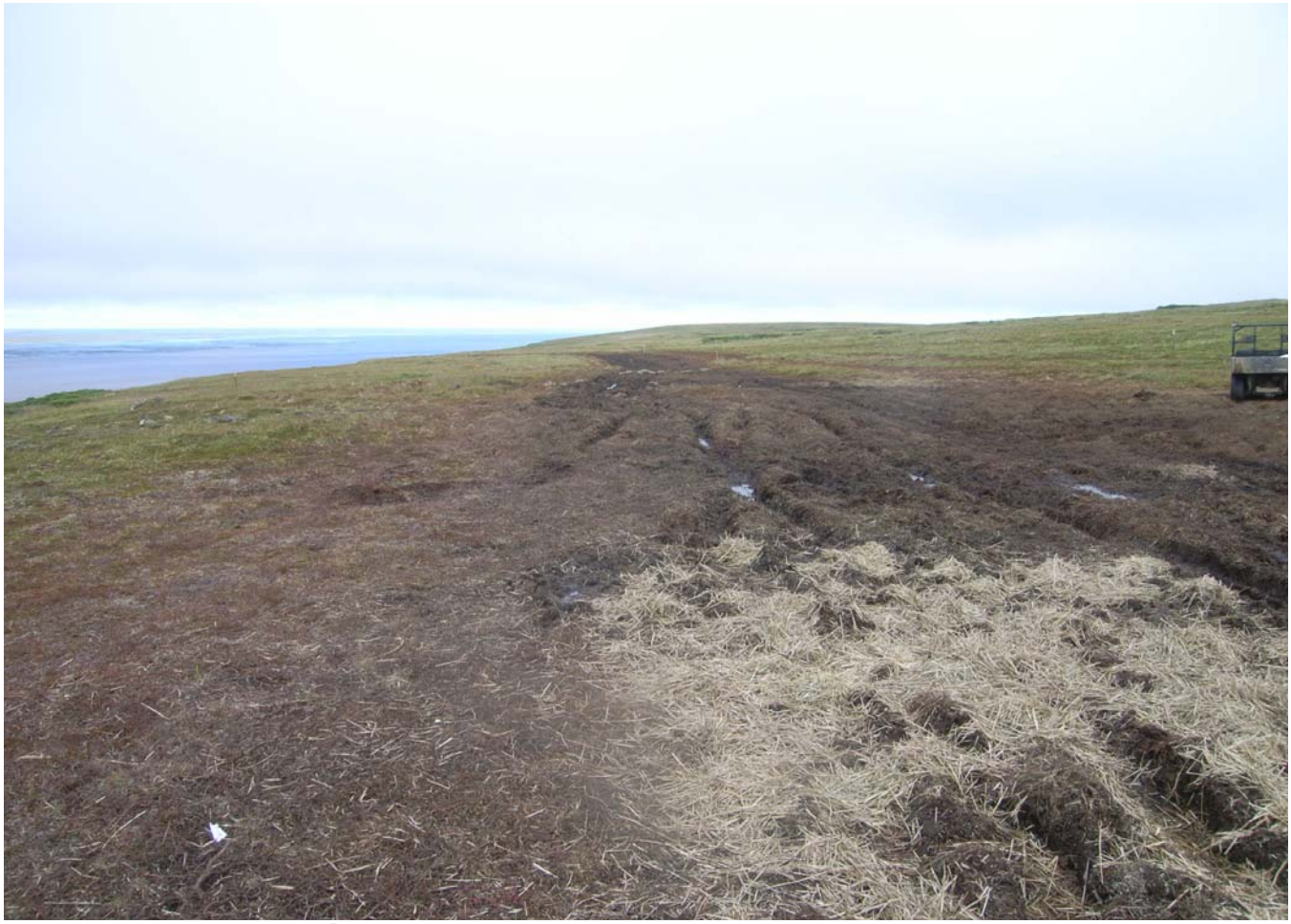
Red colored rock at quarry

PHOTO LOG

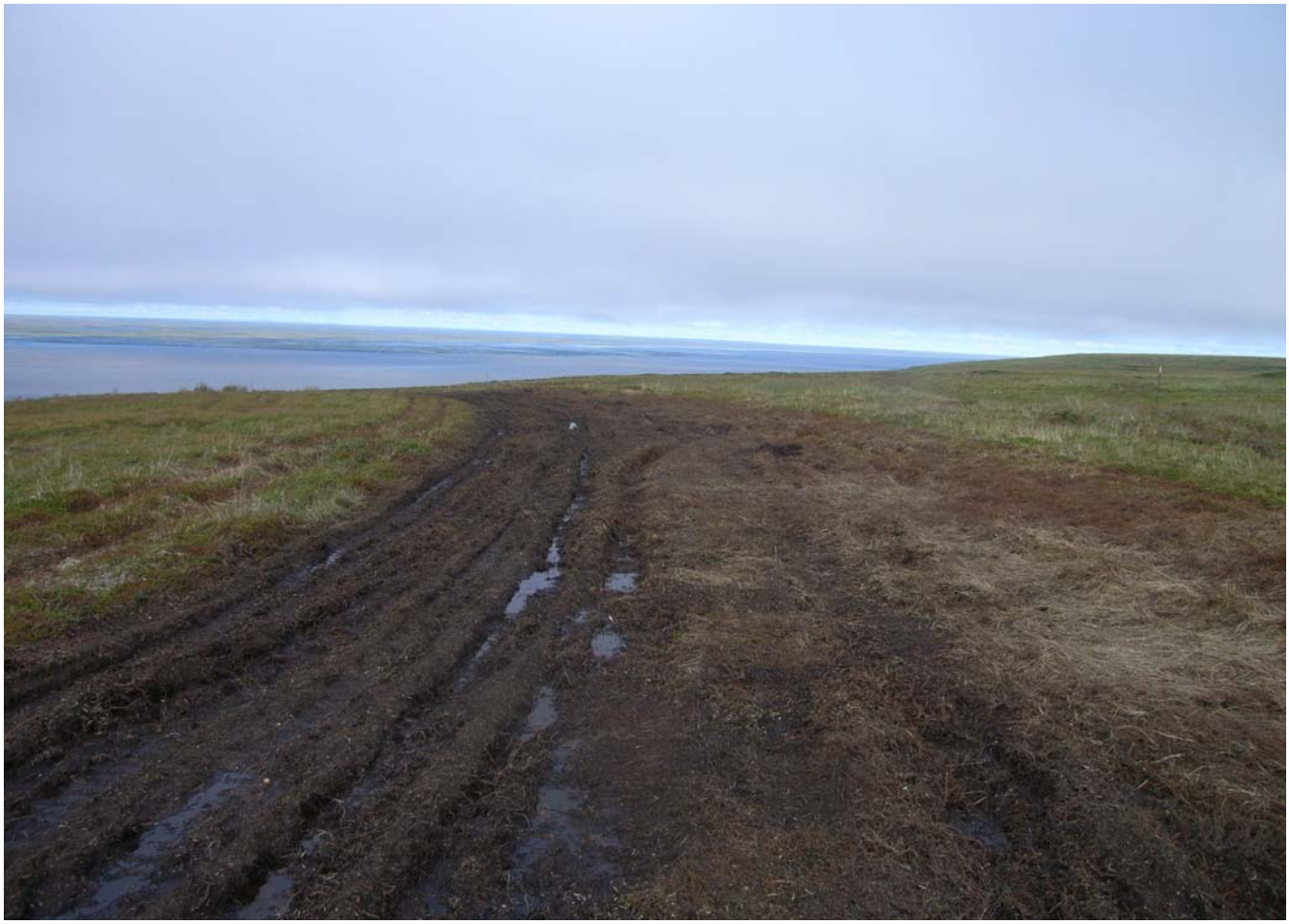
Red rock at the quarry

Shot rock at quarry with red rock in foreground

PHOTO LOG



Quarry access road



Quarry access road

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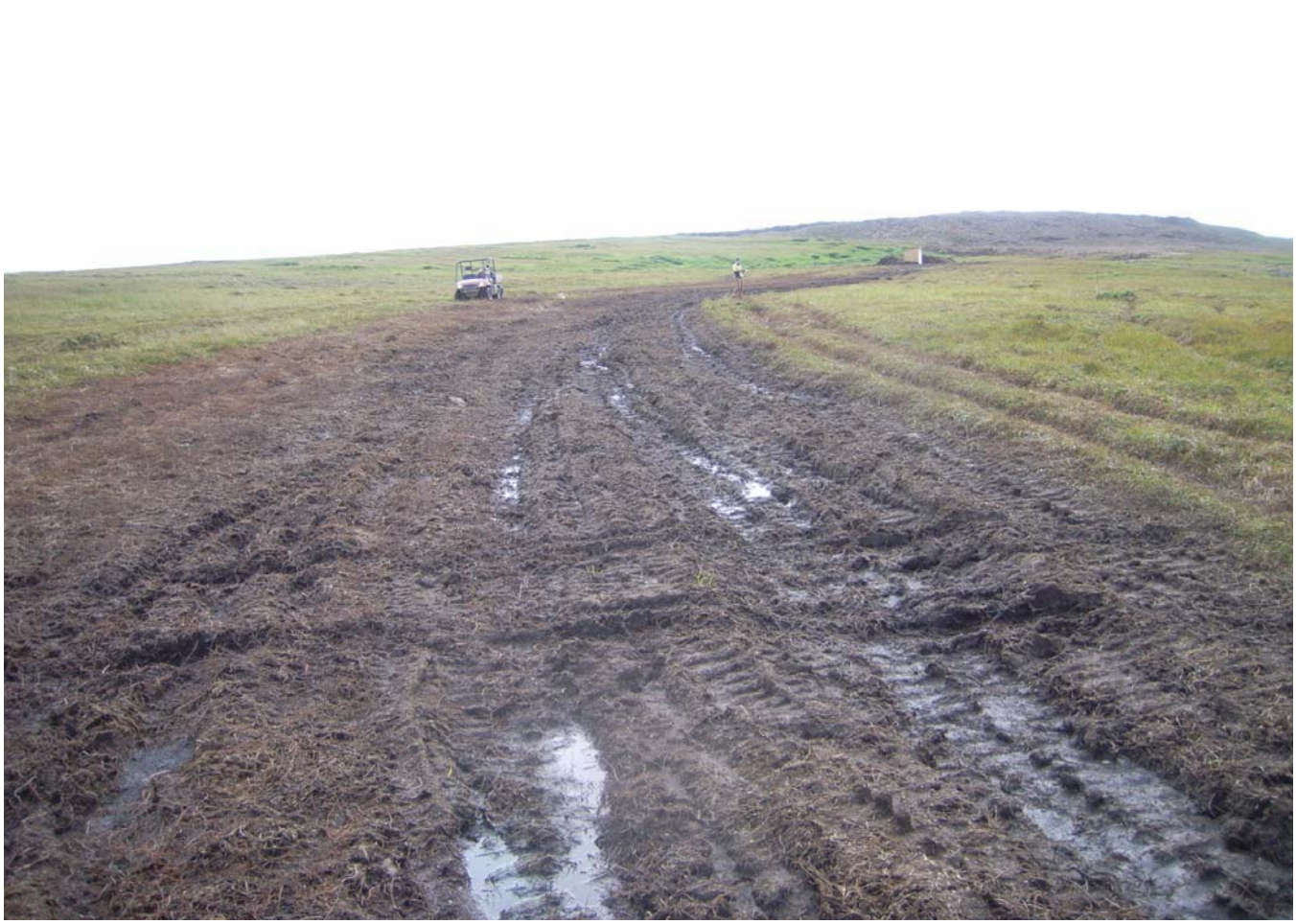
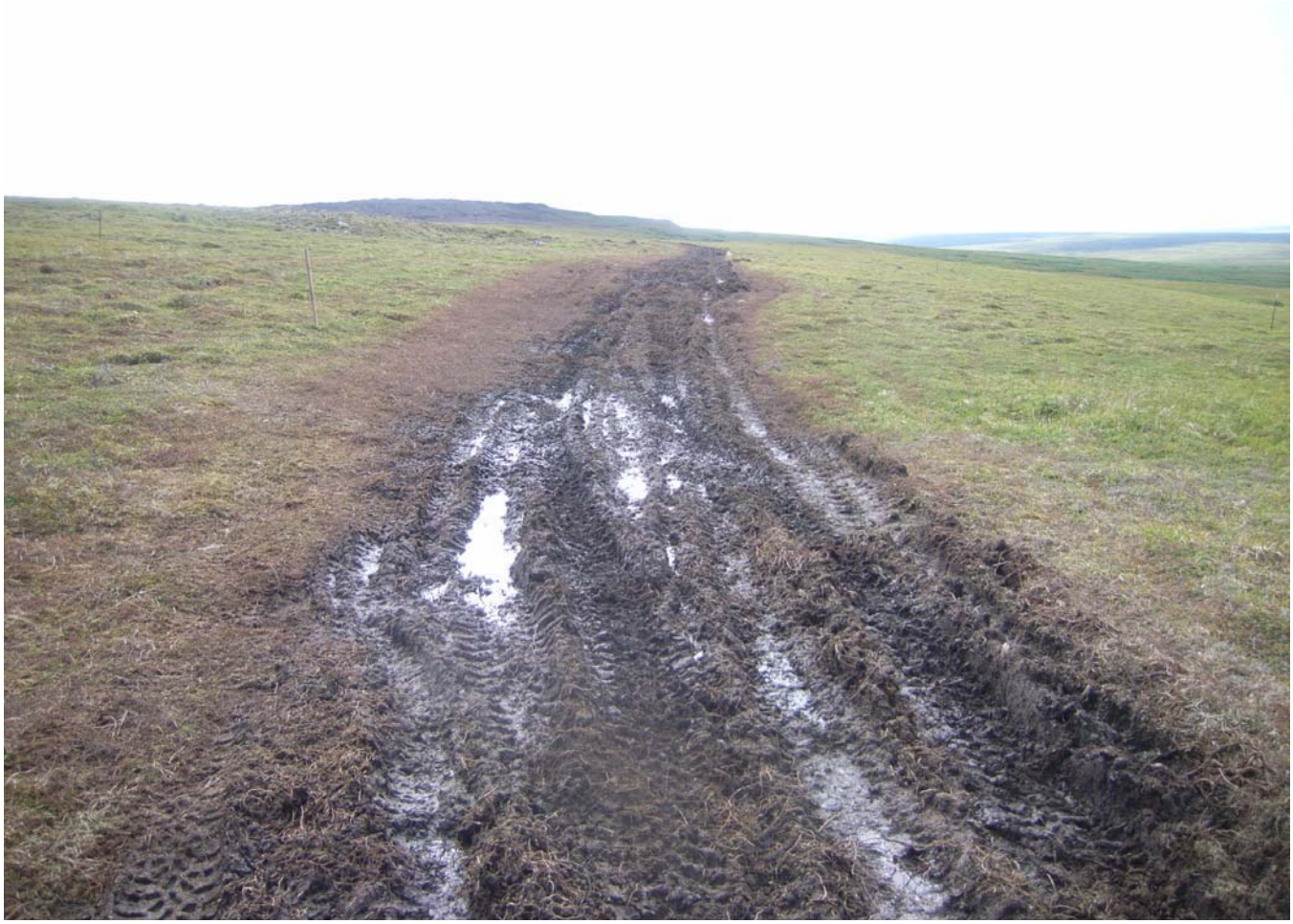
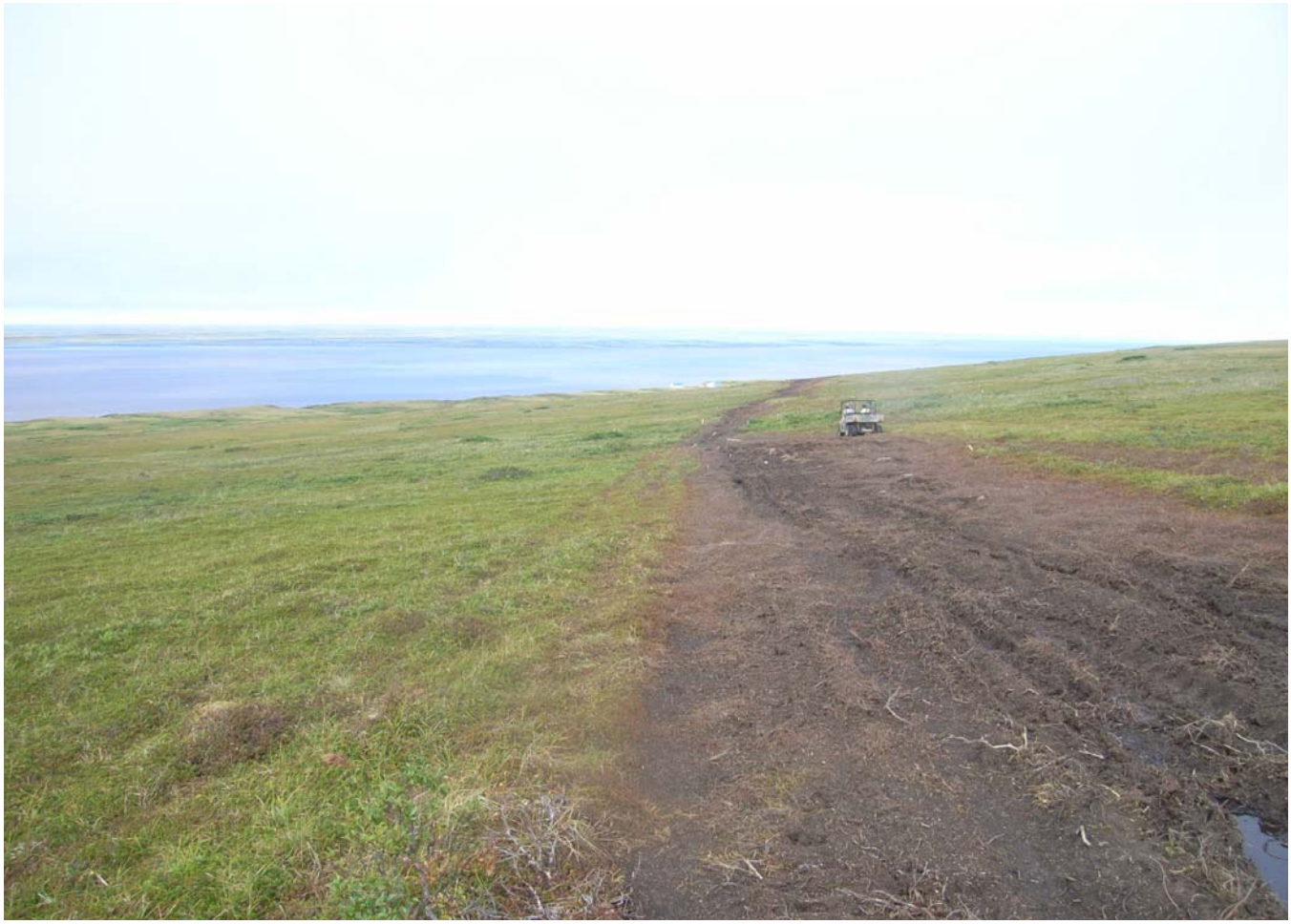


Quarry access road

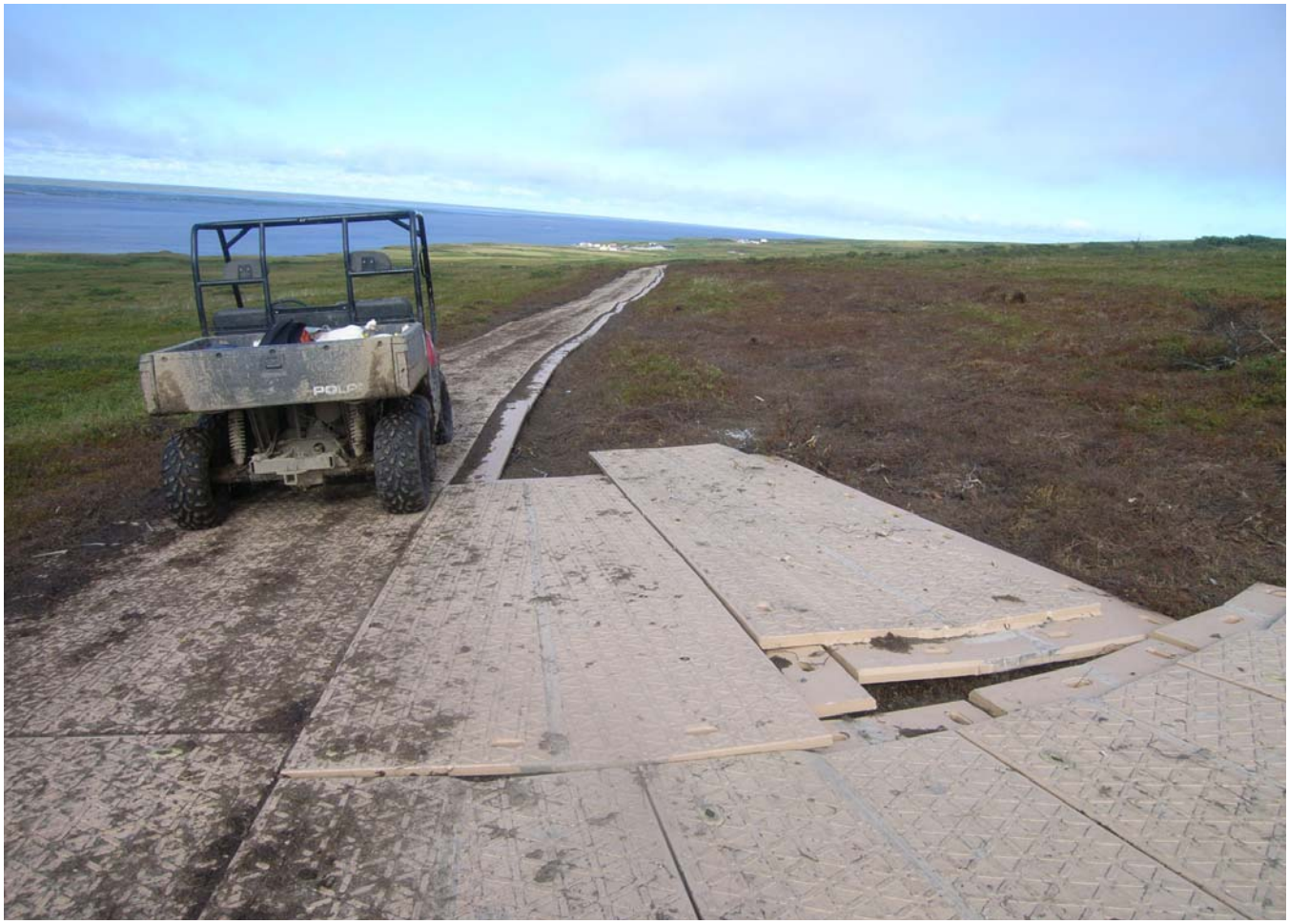


Quarry access road

PHOTO LOG

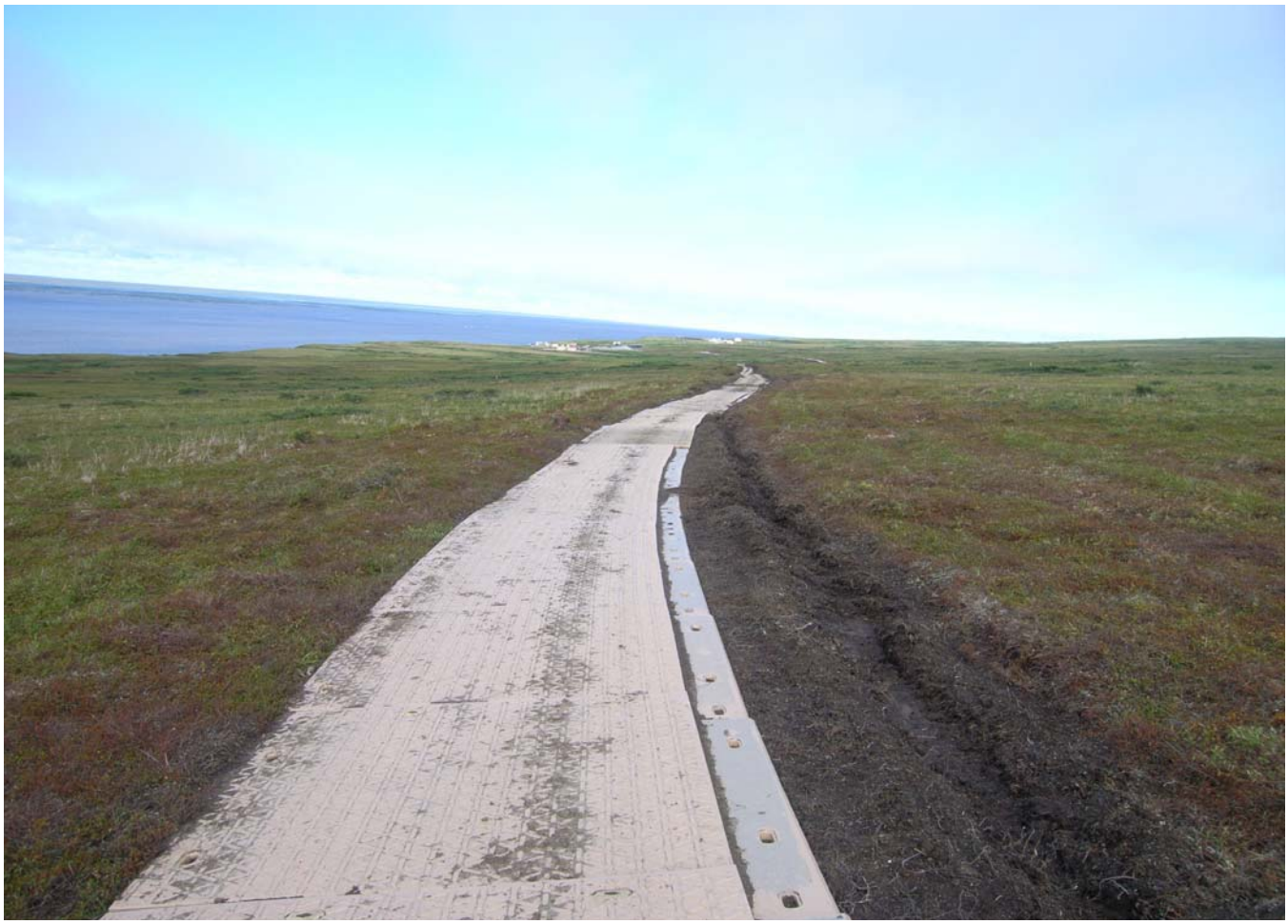


Quarry access road

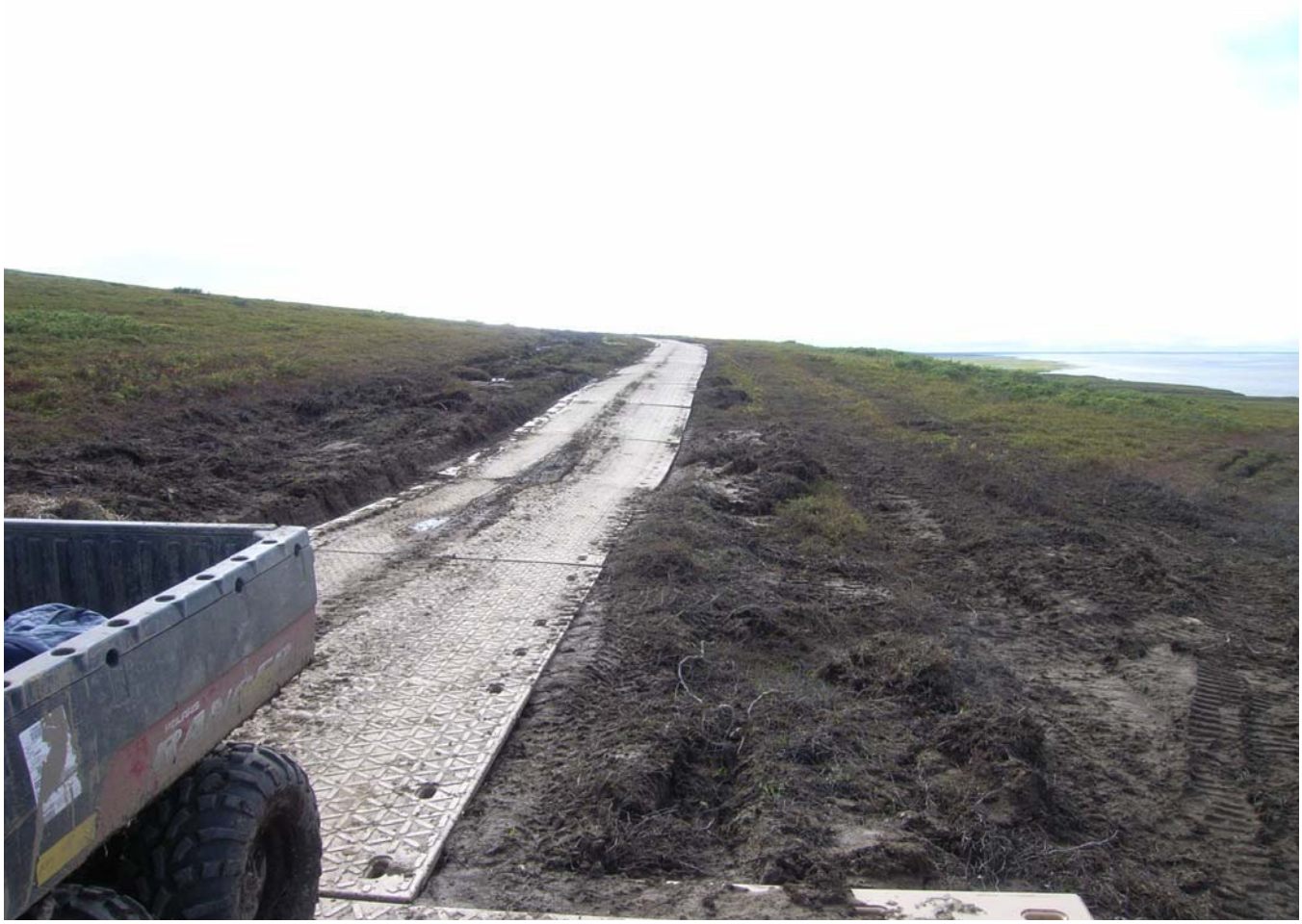


Quarry access road - geo mats

PHOTO LOG

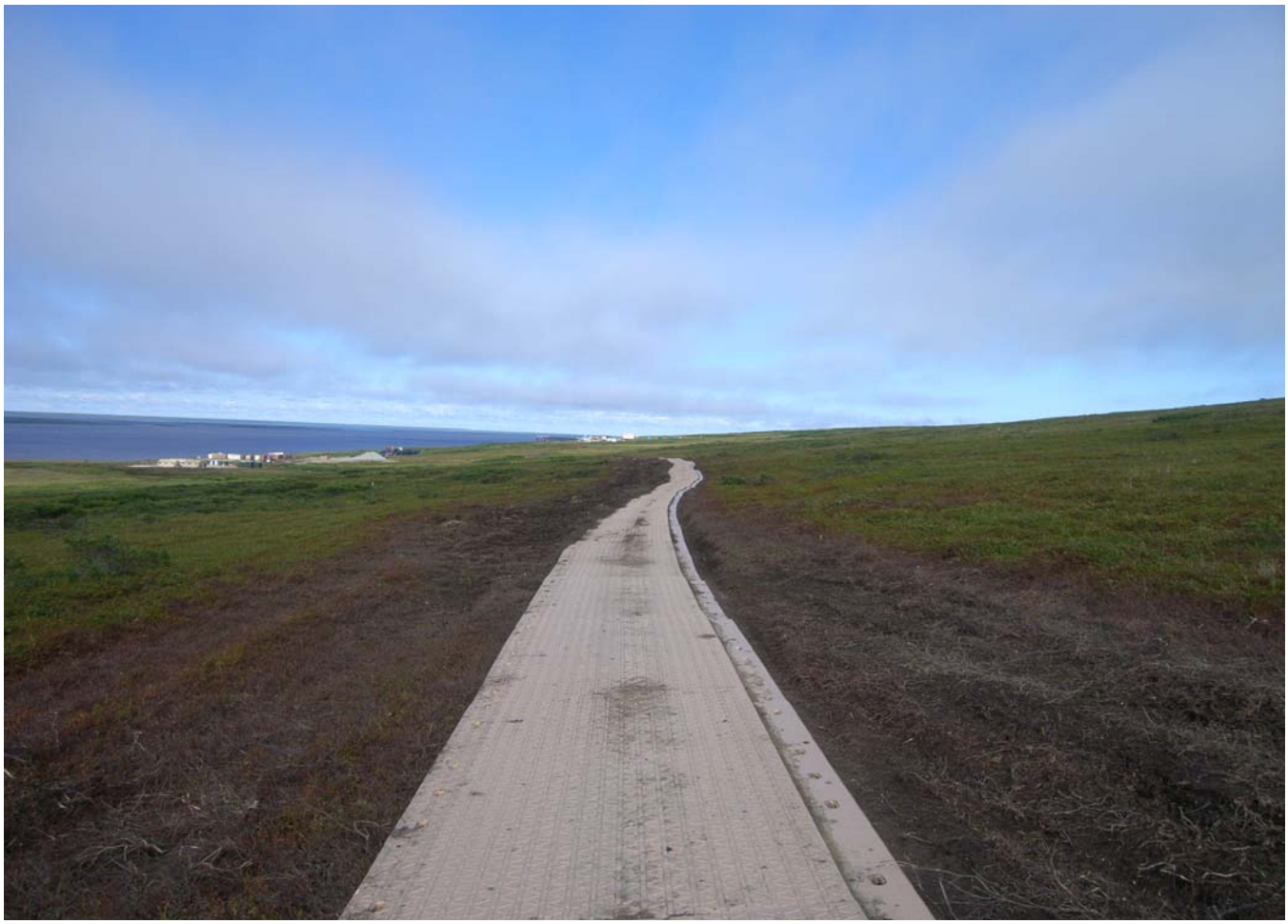


Quarry access road with geo mats

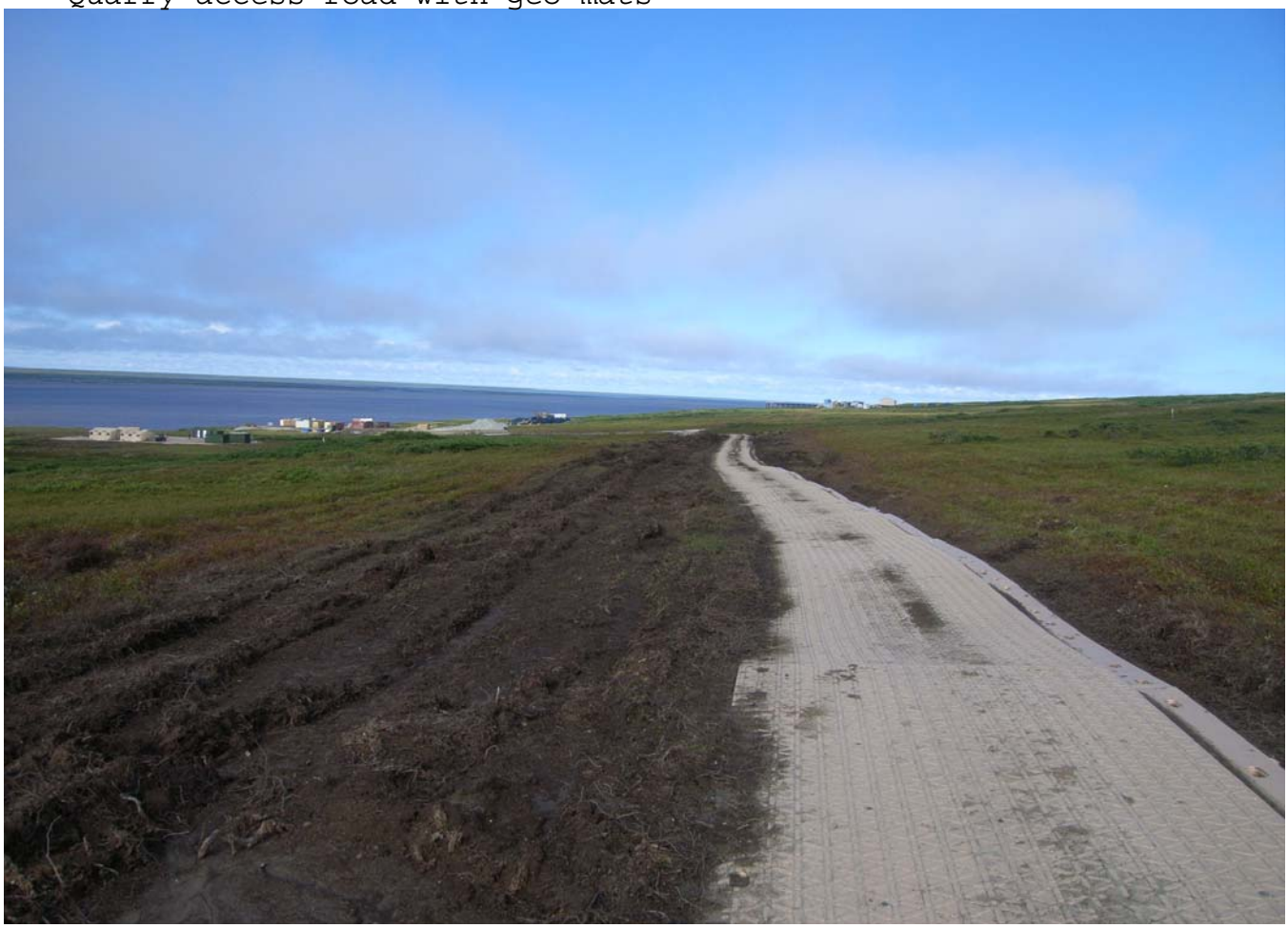


Quarry access road with geo mats

PHOTO LOG



Quarry access road with geo mats



Quarry access road with geo mats