Oil And Gas

Fontas Road Aggregate Prospect: Kilometre 48, NTS 94H, Northeastern British Columbia

Aggregate Prospecting Report 2009–1

Ministry of Energy, Mines and Petroleum Resources
Resource Development and Geoscience Branch

BRITISH COLUMBIA
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Oil and Gas Division
Resource Development and Geoscience Branch
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Table of Contents

Fontas Road Aggregate Prospect: Kilometre 48, NTS 94H, Northeastern British Columbia

FONTAS ROAD AGGREGATE PROSPECT: KILOMETRE 48, NTS 94H, NORTHEASTERN BRITISH COLUMBIA

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Key Words: aggregate, sand and gravel, road construction, oil and gas

EXECUTIVE SUMMARY

The Resource Development and Geoscience Branch of the British Columbia Ministry of Energy, Mines and Petroleum Resources conducted an evaluation of a sand and gravel prospect at kilometre 48 on the Fontas Road. The prospect, referred to here as the Fontas Road Prospect, is located 1 km east of the Fontas petroleum development road approximately 150 km north of Fort St John (Figure 1).

The purpose of this study is to provide a preliminary assessment of the aggregate potential of a landform identified by ministry staff. A test pitting program was conducted using an excavator that could dig to a maximum depth of approximately 5 m. In each pit, the materials present were recorded and assessed for aggregate potential.

The investigation showed there is an average of 2 m of gravel at surface over the elevated region of the feature. The gravel thins towards the margins of the area tested but is continuous over most of the feature. This preliminary evaluation suggests an indicated resource of 38 000 m^3 and an inferred resource of 54 000 m^3 based on a 2 m average thickness.

INTRODUCTION

Increased activity of the oil and gas industry in northeast British Columbia has resulted in a need for more surficial geology and aggregate potential data for the region. The Resource Development and Geoscience Branch (RDGB) is currently conducting a program focusing on identifying new local sources of construction aggregate to support the development and maintenance of all season petroleum development roads (PDRs).

This report details the results of a site investigation of a glaciofluvial feature identified as having aggregate potential. The feature is located 1 km west of kilometre 48 on the Fontas PDR (Figure 1). The nearest established gravel source in the area is located 21 km to the southeast along the Ladyfern access road. Currently, large scale aggregate demands are being met by transporting material by road from as far as Taylor, British Columbia, a 300 km round trip. It is this excessive transport distance that prompted the RDGB to investigate aggregate potential in this area.

PREVIOUS WORK

Previous systematic surficial geology and aggregate studies in the area have been relatively limited. Regional studies by Mathews (1978; 1980) provides a framework for the deglacial history of northeastern British Columbia and northwestern Alberta. Aggregate potential mapping in the area conducted by Savinkoff (2004) highlighted several low angle fans in the Milligan Creek meltwater system. A review of Ministry of Transportation and Highways aggregate files was conducted by Ortman (2004). He identifies previously tenured land that may still host aggregate reserves and suggests new targets in the general vicinity of these previous producing areas. The report suggests that the Milligan-Fontas area is part of a large system of meltwater channels and the area has high potential to host aggregate reserves. The Fontas Road prospect discussed here was not identified in any of these previous studies.

METHODOLOGY

This investigation consisted of three components including: 1) a review of aerial photography and a preliminary site-visit; 2) a test pitting program; and 3) sampling and laboratory testing.

Review of Aerial Photography and Site Investigation

Initial review of aerial photographs identified features with aggregate potential. These features were then prioritized for site investigations. At site-visits, surface materials were directly observed and recorded at hand-dug test holes. Recommendations were made for additional work wherever granular material was encountered.

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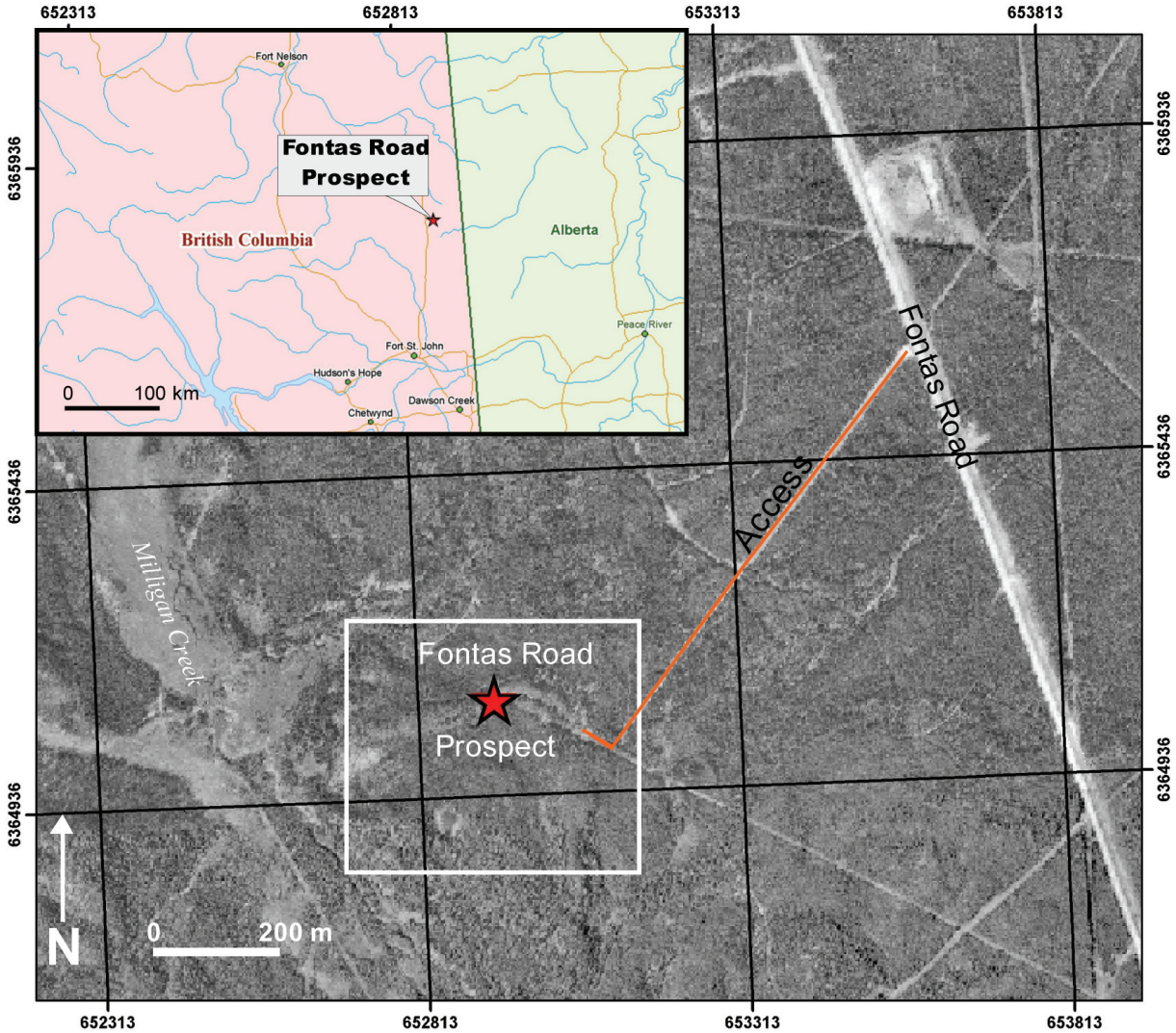


Figure 1.The Fontas Road Prospect is located 1 km west of the Fontas Petroleum Development Road along the east bank of Milligan Creek.

Test Pitting

Test pitting was carried out to confirm the depth to, and/or thickness of sand and gravel. The pits were dug with a Caterpillar 320L tracked excavator with a boom with an effective maximum digging depth of approximately 5 m. The distribution of the test pits was designed to cover the highest relief portions of the feature and two control pits off the feature. Each pit was measured, logged, and described.

Sampling and Laboratory Testing

A single 30 kg (five gallon pail) sample was collected from test pit TPFR05-02 to provide initial characterization of the sediment. It should be noted that a single sample is insufficient to represent the entire feature and many samples are required to accurately characterize a deposit. The sample consisted of the sand to small cobble size fraction; oversized clasts (>76 mm) were discarded in the field. The sample was submitted to Peace Country Technical Services Limited of Dawson Creek for analysis including sand equivalence, degradation, Los Angelas (LA) abrasion, and grain-size distribution.

RESULTS

Review of Aerial Photography and Site Investigation

The Fontas Road Prospect was identified during the aerial photograph review as a kame/esker or erosion remnant with aggregate potential, warranting a ground investigation. Kames/eskers are glaciofluvial landforms that develop from running water under, adjacent to, on or within a glacier. These landforms are composed of sand and

gravel and are therefore highly prospective for aggregate resources. The Fontas Road kame/esker is an arcuate ridge approximately 300 m in length with an average width of 30 m. The feature covers an area of approximately 20 000 m^2. A preliminary site-visit was conducted and revealed gravel at surface over much of the elevated portion of the feature. Further exploration work was recommended.

Test Pitting

A total of 11 pits were dug for this study (Figure 2). Nine of the pits are located on the crest or upper flank of the feature and two control pits (TPFR05-10 and TPFR05-11) are located off the elevated portion of the ridge (Figure 2). The depths of the pits ranged from 3.5 to 5.0 m with an average depth of 4.3 m. The test pitting confirmed gravel at surface in all pits with the exception of control pit TPFR05-11 which contained no granular material (Table 1). Gravel thickness ranges from 0.9 to 2.4 m and averages 2.0 m over the portion of the feature with significant relief. The thickest gravel was encountered in test pit TPFR05-10, located off the main ridge. Detailed logs for all test pits are provided in Appendix A.

Laboratory

Laboratory analysis included testing sand equivalent, gradation (grain-size distribution), degradation, and LA abrasion. Results are presented in Table 2. For reference, analytical results are compared to MoT specifications for quality and processing requirements.

DISCUSSION AND RECOMMENDATIONS

Test pitting results indicate gravel occurs at surface over the entire elevated portion of the feature. The one sample analyzed consists of sediment classified as dirty gravel with some fines according to the Modified Unified Classification System for Soils (MUCSS). The material consists of pebble to cobble clasts in silt to sand matrix. 53% of the sample is larger than sand size (>4.75 mm) and 10% occurs in the fine size fraction (<0.75 mm) (Figure 3). The gravel on the crest of the feature thins to less than 1 m on the northwestern portion and 1.5 m on the southern portion of the feature. The other pits on the ridge consistently have 2 m or more of gravel at surface.

Based on MoT specifications (Figures 4 to 8), laboratory analyses indicate that the material is best suited for High Fines Granular Surfacing Aggregate or Select Granular Sub Base, although processing is required. The material meets sand equivalent specifications for Sub Base and Surfacing Aggregate (Table 2). The degradation factor meets specifications for all aggregate purposes. The gradation analysis indicates processing is required mainly to reduce fines to less than 5%.

In order for the material to be used as High Fines Granular Surfacing Aggregate (Figure 4), screening or crushing of clasts greater than 20 mm is required. Although crushing may decrease the clasts size, the additional fines generated will require processing in order to maintain the appropriate gradation specifications. The material may be suitable for 25 and 50 mm Well Graded Base Course Aggregate if both the larger size fraction (>20 mm and >50 mm size fraction for the 25 mm and 50 mm specifications, respectively) and the fines can be reduced (Figure 5). The material is not appropriate for Intermediate Graded Base Coarse Aggregate

TABLE 1. SUMMARY OF TEST PIT LOCATIONS AND GRAVEL THICKNESS FROM SURFACE.

Test Pit	Position	Easting	Northing	Thickness (m)
TPFR05-01	Ridge Crest	653062	6364997	1.5
TPFR05-02	Ridge Crest	653065	6365057	2.1
TPFR05-03	Ridge Crest	653037	6365098	2.2
TPFR05-04	Ridge Flank	652993	6365108	2.3
TPFR05-05	Ridge Flank	652999	6365135	2.4
TPFR05-06	Ridge Flank	652825	6365122	1.8
TPFR05-07	Ridge Crest	652808	6365077	0.9
TPFR05-08	Ridge Crest	652922	6365108	1.0
TPFR05-09	Ridge Crest	653085	6365098	1.9
TPFR05-10	Off Ridge	653125	6365019	3.8
TPFR05-11	Off Ridge	653191	6365105	0.0

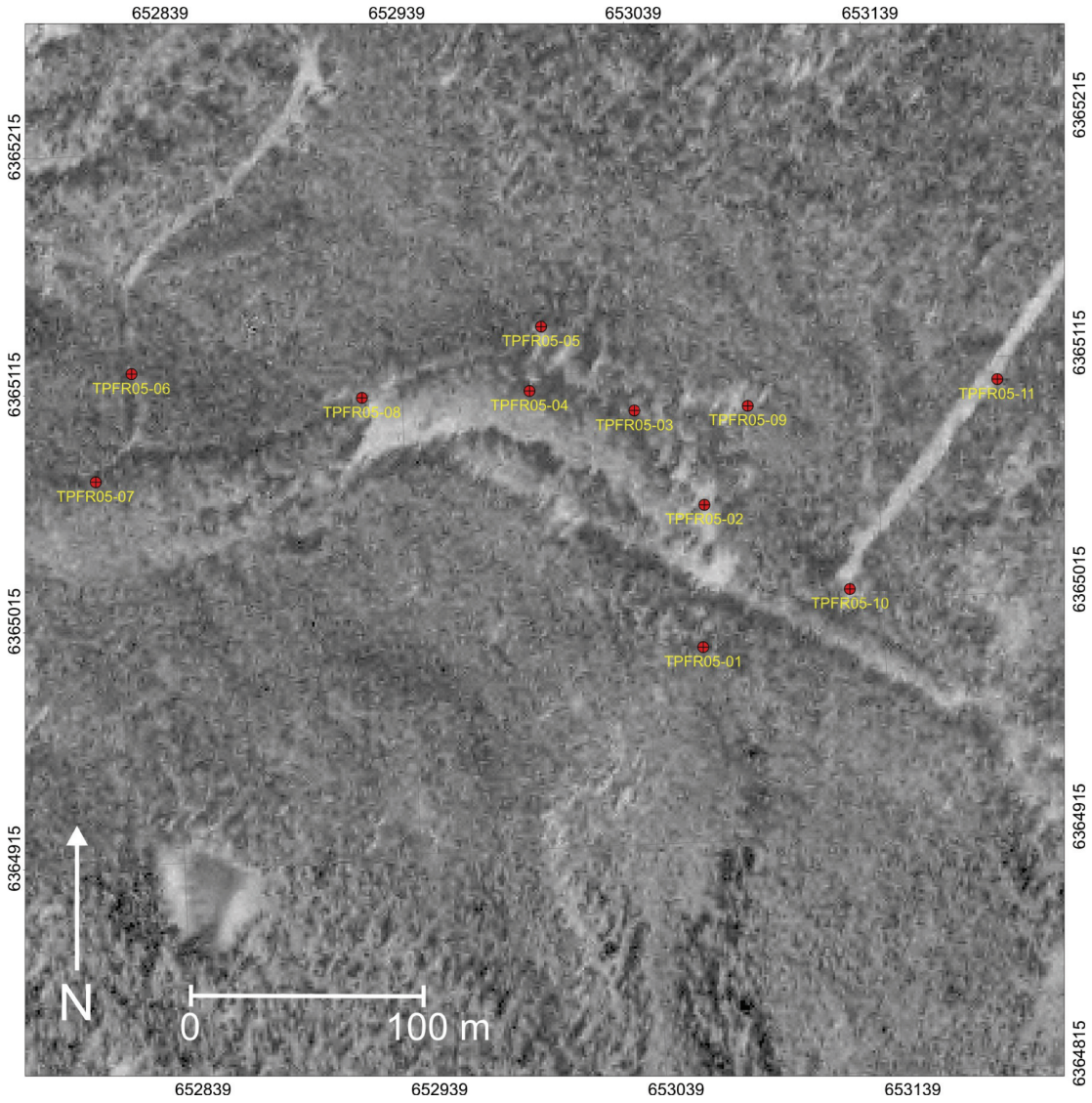
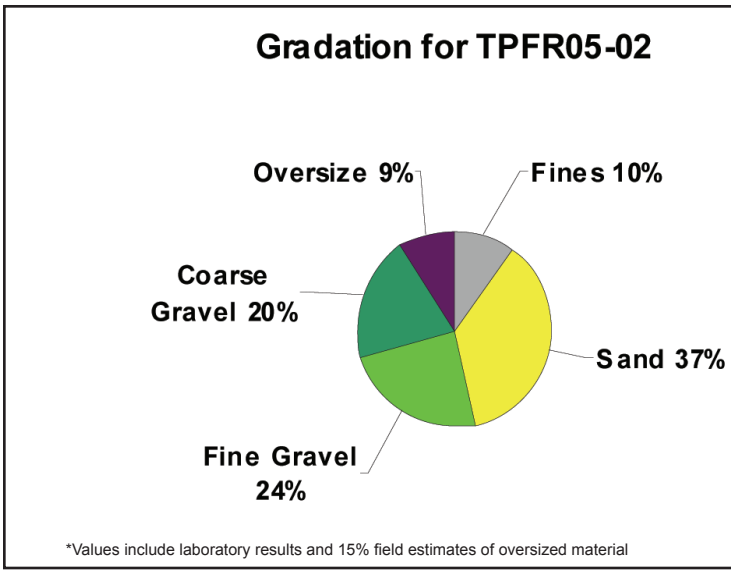


Figure 2. Test pits locations at the Fontas Road Prospect.

TABLE 2. LABORATORY RESULTS FOR SAMPLE TPFR05-02.

Quality Test	Result	MoT Specification
Sand Equivalent	20	>40 for 25 and 50 mm base course aggregate >30 for 75 mm base course aggregate > 20 for sub-base aggregate and surfacing aggregate
Degradation Factor	55	> 35 for all aggregate
LA Abrasion (Small Size Coarse Aggregate)	31.8%	Not Used

or Open Graded Base Course Aggregate (Figures 6 and 7). Reducing the fine fraction would make this material suitable for Select Granular Sub Base (Figure 8). Although the pit run material from the one sample does not meet MoT specifications, the material may still be of value as there is limited supply of aggregate in the area and other samples may show better results.



	Normalized* (mm)	% Passing
Oversize	>75	100.0
Coarse Gravel	75	90.9
	50	88.3
	37.5	83.0
	25	76.6
Fine Gravel	19	70.5
	12.5	62.6
	9.5	58.0
Sand	4.75	46.6
	2.36	36.8
	1.18	30.1
	0.6	24.5
	0.3	17.9
	0.15	13.5
Fines	0.075	10.0

Figure 3. Grain-size distribution of Sample TPFR05-02.

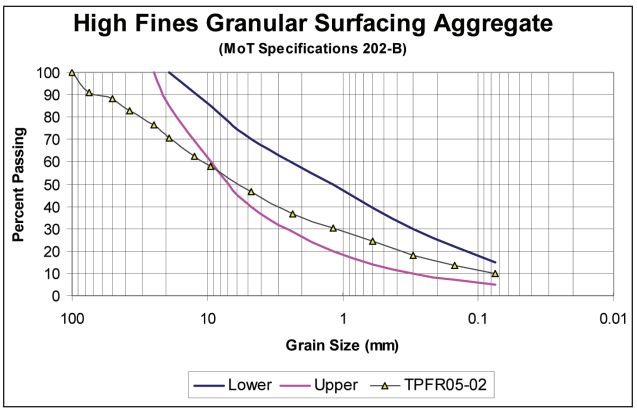


Figure 4. The upper and lower curves define the grain size distribution acceptable by MoT for high fines granular surfacing aggregate .

Preliminary estimates of the gravel resource are based on three categories: an indicated, an inferred and a potential resource (Table 3, Figure 9). The indicated resource is based on the extent of the test pitting and provides a minimal expected resource for this feature. The inferred resource extends the indicated resource boundary to include all elevated portions of the feature. However, because this area includes portions of untested ground, the volume of gravel is more speculative. Finally, the potential resource includes the areal extent of the ridge as well as the slightly elevated and better drained portion of the surrounding terrain. This area is included in the potential resource estimate because TPFR05-10 shows that gravel is present adjacent to the main ridge, at least locally. The potential estimate has the lowest confidence as much of the area to the east of the feature has not been tested and is therefore unproven.

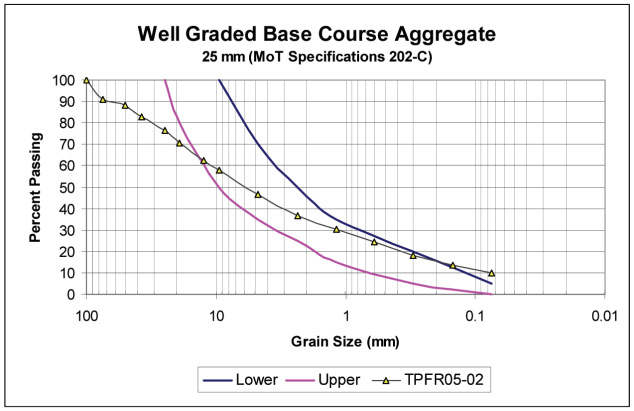
SUMMARY

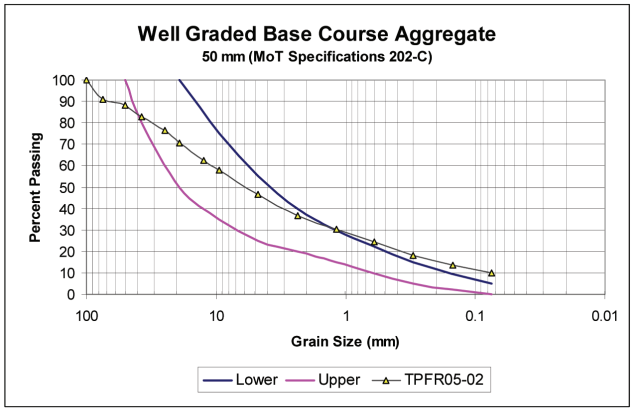
- Test pitting has demonstrated that gravel up to 2 m in thickness occurs on the elevated portion of the prospect suggesting an indicated resource of 38 000 m^3, inferred resource of 54 000 m^3, and a potential resource of 166 000 m^3.
- Laboratory analysis indicates that the material at one site is most suited for High Fines Granular Surfacing Aggregate and Select Granular Sub Base. However, it does not meet MoT specifications without processing.
- This investigation demonstrates that there are suitable sand and gravel prospects in the area. Additional work is recommended to locate and test similar features.

TABLE 3. PRELIMINARY VOLUME ESTIMATES OF GRAVEL AT THE FONTAS ROAD PROSPECT.

Resource Category	Estimated Area (m^2)	Estimate Volume (m^3)*
Indicated	19 000	38 000
Inferred	27 000	54 000
Potential	83 000	166 000

*All volumes are based on a rectangular cross-section and an average gravel thickness of 2.0 m.





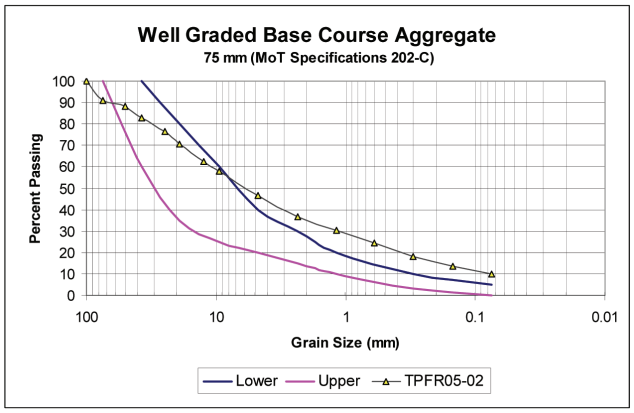
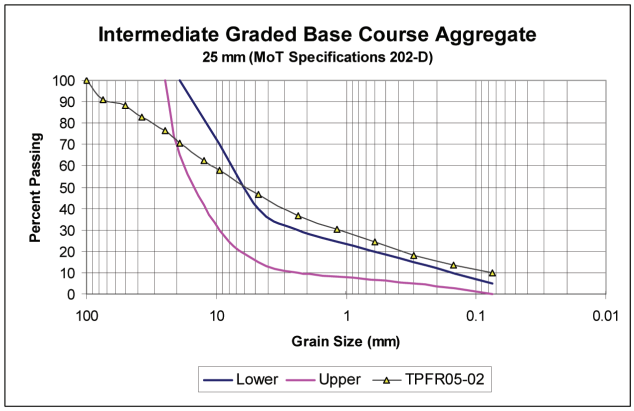
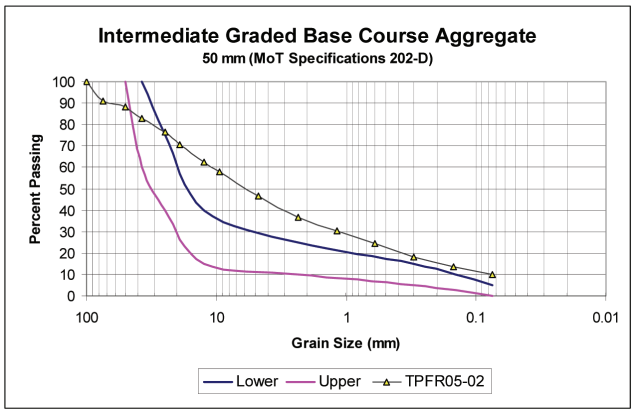


Figure 5. Pit-run grain-size results from sample TPFR05-02 plotted with MoT 25, 50, and 75 mm crushed aggregate specifications for well graded base coarse aggregate.





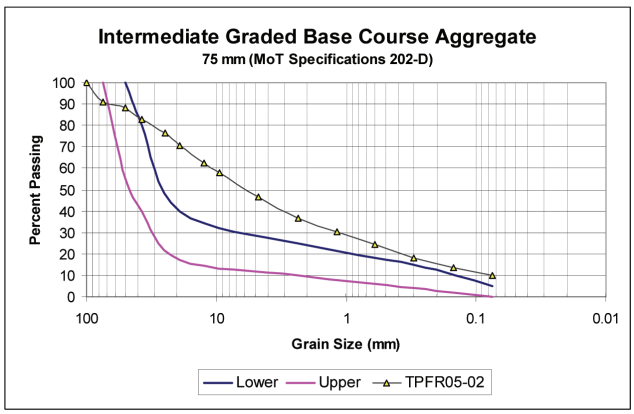
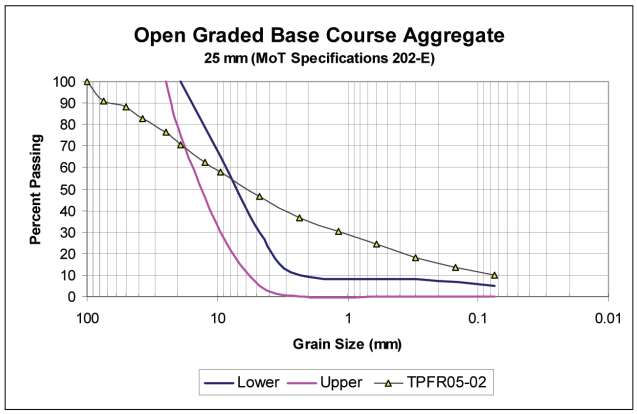
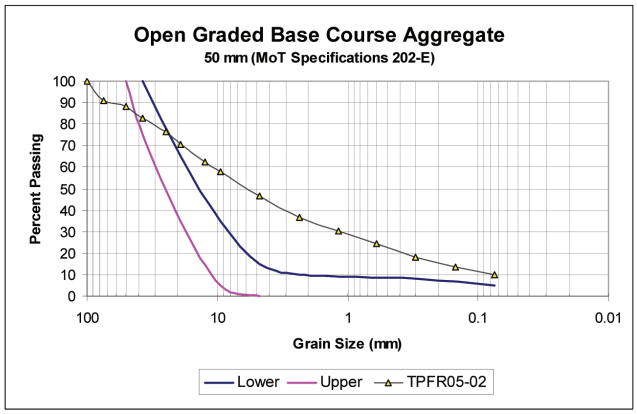


Figure 6. Pit-run grain-size results from sample TPFR05-02 plotted with MoT 25, 50, and 75 mm crushed aggregate specifications for intermediate graded base coarse aggregate.





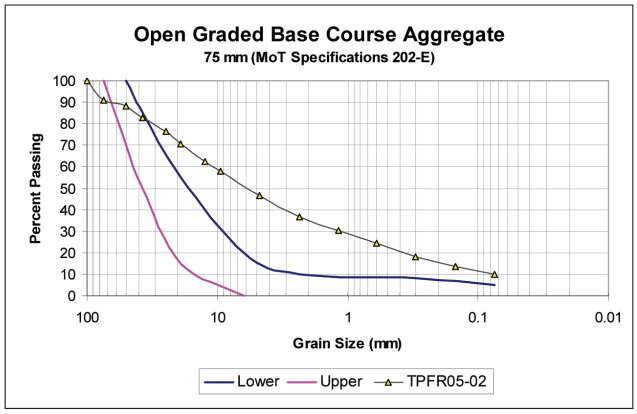


Figure 7. Pit-run grain-size results from sample TPFR05-02 plotted with MoT 25, 50, and 75 mm crushed aggregate specifications for open graded base coarse aggregate.

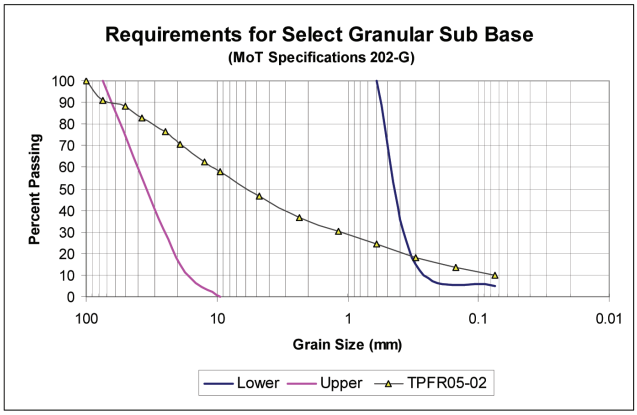


Figure 8. Pit-run grain-size results from sample TPFR05-02 plotted with MoT specifications for select granular sub-base.

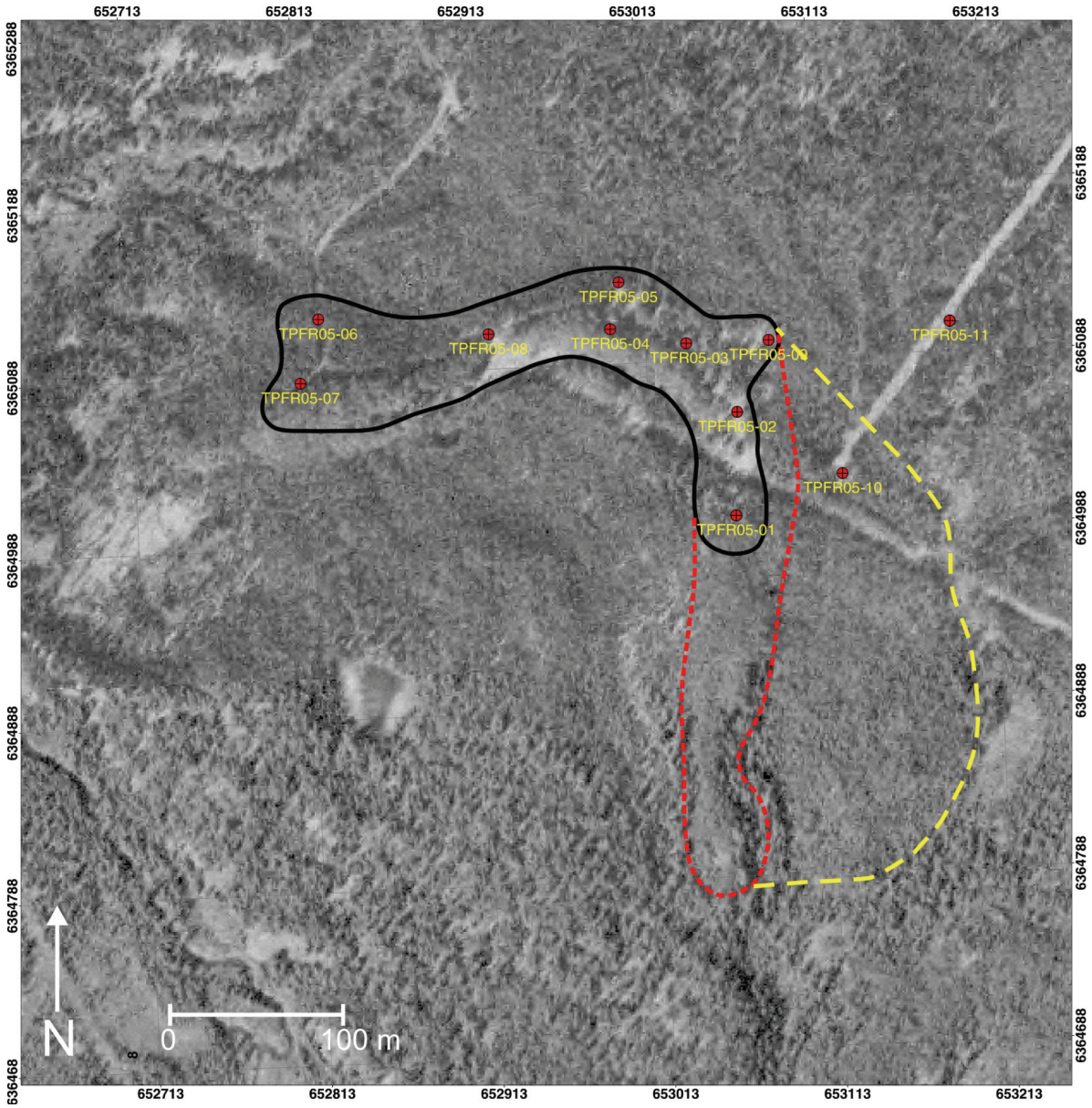


Figure 9. Three preliminary resources estimate are shown for the Fontas Road Prospect. The indicated resource (solid black) is based on the extent of gravel confirmed by test pitting. The inferred resource (dashed red) reflects the extent of the elevated portion of the feature. The potential resource (long dashed yellow) includes the inferred resource in addition to a slightly elevated region adjacent to the feature that may also contain sand and gravel, as indicated by test pit TPFR05-10.

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APPENDIX A. TEST PITS

BRITISH COLUMBIA

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Oil and Gas Division
Resource Development and Geoscience Branch

TEST PIT No. TPFR05-01

Date	Feb. 25, 2005	**Excavator Type**	CAT 320	**Location Notes**	South of seismic line in spruce and pine stand, on ridge crest, 4.5 TD
Project		**Contractor**	J.D. Piling & Anchor		
Area	Fontas Road	**Weather**	Sunny, ~ 0 deg C		
Northing	6364997 **Easting** 653062			**Marked in Field**	Flagging
Elevation	828	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	1.5	GRAVEL and SAND	GM	10	40	30	20	10	NA		Poorly sorted, good gravel with sandy matrix; massive; well rounded to sub-angular; mainly local clasts.
1.5	2.6	SAND and GRAVEL	SM	20	50	30	0	6			Sand with some gravel; coarsens up; gradational upper contact; sharp lower contact.
2.6	4.2	SAND, clayey	SC	30	70	0					Laminated, silty-clay to silty-sand and fine sand; no clasts.

Gravel from top 1.5 m.

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TEST PIT NO. TPFR05-02

Date	Feb. 25, 2005	**Excavator Type**	CAT 320	**Location Notes**	On hill crest north side of seismic line
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Sunny-overcast, ~0 deg C		
Northing	6365057 **Easting** 653065			**Marked in Field**	Flagged
Elevation	829	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	2.1	GRAVEL, sandy	GM	10	35	40	15	15	NA	TPFR05-02	Good gravel with medium to coarse sand matrix; well-rounded clasts; some fine sand and silt; oxidized in places.
2.1	4.8	SAND, clayey	SC	30	70	0					No clasts; well laminated fine silty sand; oxidized in places.

Gravel over laminated silty, clayey fine sand. The contact is shown by the black line.

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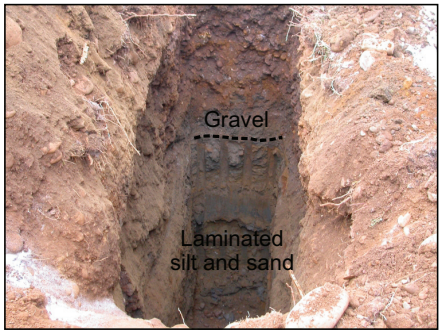
TEST PIT NO. TPFR05-03

Date	Feb. 25, 2005	**Excavator Type**	CAT 320	**Location Notes**	On hill crest, a intersection of ridge and N-S trending ridge; top of ridge near south flank
Project		**Contractor**	JD Pilling & Anchor		
Area	Fontas Road	**Weather**	Overcast ~ 0 deg C		
Northing	6365098 **Easting** 653037			**Marked in Field**	Flagged
Elevation	825	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	2.2	GRAVEL, sandy	GM	10	30	40	20	20	NA		Coarse gravelly sand; larger clasts are well-rounded; mainly local; some chert; good aggregate.
2.2	4.5	SILT and SAND	ML	60	40	0					No clasts; silty-clayey-fine sand; crudely bedded; mostly oxidized.
4.5	5	SAND, gravelly	SP	15	60	25	0	5			Mostly oxidized gravely sand.



◀Gravel over laminated silty and fine sand.

Gravel from upper 2.2 m. ▶

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TEST PIT NO. TPFR05-04

Date	Feb. 25, 2005	**Excavator Type**	320 L	**Location Notes**	Dug on southern side of ridge; all poplar; cut in from flank northward; max depth ~ 5 m
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Overcast, ~1 deg C		
Northing	6365108 **Easting** 652993			**Marked in Field**	Flagging
Elevation		**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	2.3	GRAVEL, sandy	GM	10	30	40	20	25			Gravel; gravelly-sandy matrix ; cobble to small boulder clasts typically well-rounded to sub-angular; sharp lower contact.
2.3	3.8	SILT and CLAY, some sand	ML	80	20	0					Clayey-silty-fine sand; laminated.
3.8	4.3	SAND, some silt, trace gravel	SM	20	70	10					Coarse to medium sand with rare to occasional cobble clasts.

Gravel from upper 2.3 m.

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TEST PIT NO.: TPFR05-05

Date	Feb. 25, 2005	**Excavator Type**	CAT 320L	**Location Notes**	Located on the northern flank and cut back into ridge; still part of the upper flank of the ridge; too steep for machine to dig; TD 3.2
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Overcast ~ 0 deg C		
Northing	6365135 **Easting** 652999			**Marked in Field**	Flagging
Elevation	826	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	2.4	GRAVEL, sandy	GM	10	30	40	20	20			Gravel at surface; thicker to flank of ridge; coarse to medium sand matrix with abundant cobble to pebble clasts; mode cobble.
2.4	3.2	SAND, silty, clayey	SM	25	75	0					Laminated medium sand with silt; moderately bedded
3.2	3.5	SILT and CLAY, sandy	ML	70	30	0					Silt and fine sand laminated with clay; no clasts

Gravel in upper 2.4 metres. The view is to the south into the ridge.

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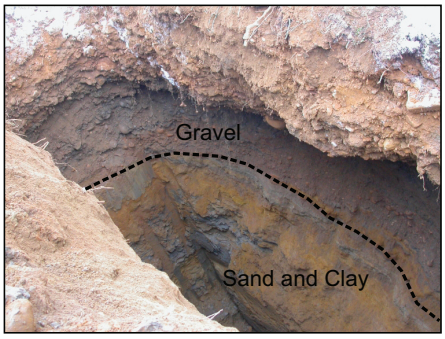
TEST PIT NO.: TPFR05-06

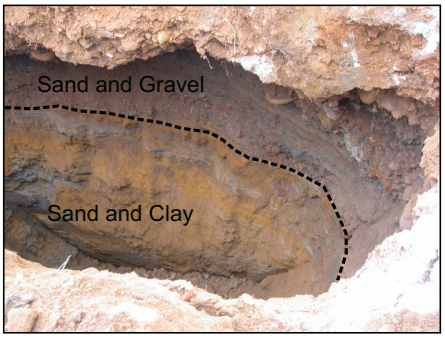
Date	Feb. 25, 2005	**Excavator Type**	CAT 320L	**Location Notes**	Walked the excavator down trail on west flank of feature; Pit located 10 m down slope (vertical) on small bench
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Overcast ~ > 1 deg C		
Northing	6365122 **Easting** 652825			**Marked in Field**	Flagging
Elevation	797	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	1.8	GRAVEL and SAND	GM	10	35	35	20	15	NA		Gravel; matrix supported; clasts round to sub-angular; crudely stratified; mode clast size is pebble to small cobble; base has inter-fingering sandy contact.
1.8	4.2	SAND and SILT	SC	40	60						Medium sand to fine-clayey sand; well stratified; oxidized with grey unoxidized layers; horizontal bedding, gravel does not draped.



The upper portion of the pit contains inter-bedded sand and gravel over bedded and laminated fine silty sand and clay. ▶

◀Gravel over laminated silty fine sand and clay,



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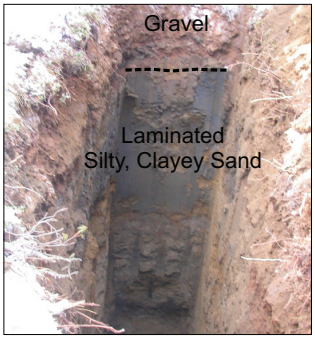
TEST PIT NO. TPFR05-07

Date	Feb. 25, 2005	**Excavator Type**	CAT 320L	**Location Notes**	Located on west end of feature on crest; TD 4.6
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Sunny, ~ > 1 deg C		
Northing	6365077 **Easting** 652808			**Marked in Field**	Flagging
Elevation	898	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	0.9	GRAVEL, sandy	GM	10	20	50	20	10	NA		Gravel; clast supported; sand matrix; pebble - large cobble; poorly sorted clasts; well-rounded - sub-rounded; sharp lower contact.
0.9	3	SILT and CLAY, some sand	CL	90	10						Clayey-silty sand; well laminated; fine sand sticky.
3	4.6	SILT, CLAY, and SAND	ML	50	50						Interbedded sand and clayey silt; sand is medium to coarse; no clasts



The gravel at this location is only 0.9 m suggesting that it may be thing to the west.

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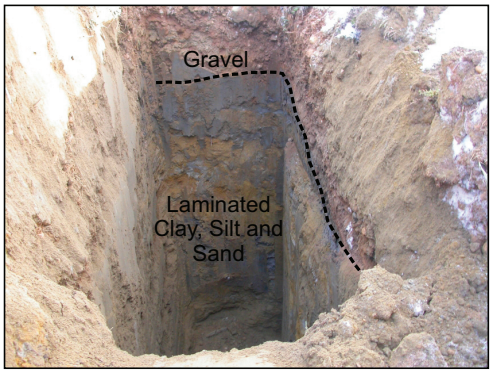
TEST PIT NO. TPFR05-08

Date	Feb. 25, 2005	**Excavator Type**	CAT 320	**Location Notes**	Located at intersection of seismic line and ridge
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Overcast		
Northing	6365108 **Easting** 652922			**Marked in Field**	Flagging
Elevation	804	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	1	GRAVEL and SAND	GM	15	35	40	10	8			Gravel; crudely stratified; matrix supported; inter-bedded with clast supported; clast size mode is pebble - small cobble; contact sharp.
1	4.2	SAND, silty, clayey	SC	30	70						Interbedded, oxidized medium sand and silty-clayey fine sand; moderately to crudely bedded; some laminations become coarser and sandier with depth; no clasts.



The gravel occurs in the top 1.0 m over laminated silty clay and fine sand inter-bedded with medium sand.

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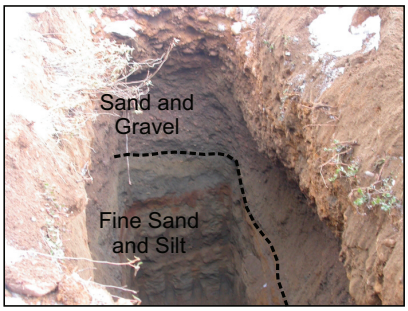
TEST PIT NO. TPFR05-09

Date	Feb. 25, 2005	**Excavator Type**	CAT 320L	**Location Notes**	Located NE of main ridge; across small hollow; TD 4.2
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas River	**Weather**	Sunny, few clouds		
Northing	6365098 **Easting** 653085			**Marked in Field**	Flagged
Elevation	807	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	1.9	SAND and GRAVEL	SW	15	55	25	10	10			Gravel; sand matrix; pebble - cobble; clast size mode large pebble; well-rounded - sub-angular; larger clasts more rounded; coarsens upward; sand at lower contact.
1.9	2.7	SAND and SILT	SM	40	60						Well bedded oxidized medium sand inter-bedded with fine sand.
2.7	4.2	SAND, trace silt	SP	10	90						Medium oxidized orange sand; some silt but less fines than above; massive.



Gravel and sandy gravel over stratified silty fine sand.

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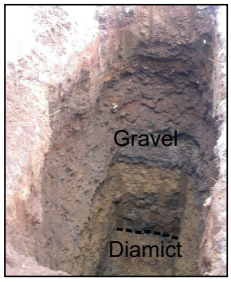
TEST PIT NO. TPFR05-10

Date	Feb. 25, 2005	**Excavator Type**	CAT 320 L	**Location Notes**	Location off the esker on the intersection of two seismic lines; TD 4.2
Project		**Contractor**	JD		
Area	Fontas Road	**Weather**	Sunny, scattered clouds, ~ > 1 deg C		
Northing	6365019 **Easting** 653125			**Marked in Field**	Flagging
Elevation	805	**Logged By**	AH	**Photo:**	3321 (pit), 3322 (pit), 3323 (till?)

Depth (m) Top	Depth (m) Bottom	Material Type Description	MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	0.8	SAND, trace gravel	SM	10	85	5		5			Sandy; few clasts; pedogenetically modified.
0.8	2.4	GRAVEL, sandy	GM	15	30	40	15	8			Gravel; gradational upper; sandy matrix; mainly rounded; clast size mode pebble, abundant cobbles; well rounded.
2.4	3.8	GRAVEL, sandy	GC	20	35	35	10	8	2.4		Similar to above though wet and more oxidized; more sandy and fewer clasts
3.8	4.2	CLAY, trace sand, trace gravel	CL	85	10	3	2	8			Either fine grained clast poor till, glaciolacustrine or overbank; some sand; shale and quartzite clasts.



Gravel

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TEST PIT NO. TPFR05-11

Date	Feb. 25, 2005	**Excavator Type**	CAT 320	**Location Notes**	On access seismic line, east of esker; black spruce typical of the area, TD 4.3
Project		**Contractor**	J.D. Pilling & Anchor		
Area	Fontas Road	**Weather**	Sunny clear, ~ > 1 deg C		
Northing	6365105 **Easting** 653191			**Marked in Field**	Flagging
Elevation	809	**Logged By**	AH		

Depth (m) Top	Depth (m) Bottom	Material Type Description	Material Type MUSCS	Estimated Gradation (%) Fines	Sand	Gravel	Oversize (%)	Max (cm)	Water Table (m)	Sample	Comments
0	1.7	CLAY, trace sand	OL	90	10						Orange-brown clayey sand; lots of organics; black.
1.7	4.3	CLAY	CH	100							Massive silty clay; no clasts present; no gravel.

This test pit contained organic-rich clay in the upper portion and massive silty clay below. The pit contained no granular material.

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