

Evaluation of Drill-Core Exploration of Sluice Site No. 1,
Chipewyan Red Granite Building Stone Project

by

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Introduction

After the initial field exploration program in 1972 a potential building stone site was hydraulically sluiced off to aid detailed mapping, sampling and evaluation (Godfrey 1971, 1972). Sluice site number one was drilled during June and July, 1975 in 6 x 25-foot deep holes to test for the depth extension of good quality granite building stone. The field program was under the initial supervision of Terry Smyth, P.Eng. (Gemini North Ltd.) and later under consultant geologist Dr. Andrew E. Nevin of Vancouver, B.C. Dr. Nevin (1975) produced a field report with maps showing the fracture pattern and topography of the drilled potential quarry site within the sluiced area.

The objective of the drilling was to obtain continuous core (i.e. 100 percent recovery) in order to be able to evaluate fracture quality and frequency as well as rock texture, color, and structural-mineralogical characteristics. Prior to detailed study and core logging, the core was thoroughly scrubbed, cleaned and clear shellaced to provide the best possible conditions for viewing and data gathering.

As the core was not scribed during drilling, to indicate its orientation in the ground, and since one objective of the drill core program was to reconstruct a three-dimensional model of the granite characteristics at the drill site, it was necessary to:

1. Carefully orient individual pieces of the broken core for each drill hole by matching across the fracture breaks, and marking a reference line so as to eliminate rotation of the core. This objective was achieved with a high level of confidence in over 90 percent of the cases.

2. Prepare a detailed map of the granite foliation (Fig. 2) at the drill site and use these data to orient the foliation in each drill core at the appropriate azimuth. The somewhat massive to poorly defined foliation in the core provides the possibility of a small error being introduced in determining the absolute core orientation.

The results of the core study are shown in log form and included as Appendix I. Two cross-sections have been drawn through two N-S lines of three drill holes each, in an attempt at correlation of both rock character and fracture pattern between drill holes. Following is a summary of the drill-hole data.

	Hole Number	Hole Depth (feet)	Relative Collar Elevation (feet)
<u>Cross Section (east holes)</u> (figure 2)			
	C ₂	24.6	501
	C ₄	25.5	495
	C ₆	24.4	483
<u>Cross Section (west holes)</u> (figure 3)			
	C ₁	23.2	500
	C ₃	24.0	493
	C ₇	25.6	488

Texture

The rocks have been classified into a basic 3-fold division according to grain size:

coarse	-	>5 mms
medium	-	1 to 5 mms
fine	-	<1 mm

3.

Gradation in grain size does occur, but grain size is typically fairly consistent in local areas, i.e. variations are normally within narrow limits. Pegmatite bands, usually from 1 to 4 inches wide, where present are specially noted in the core logs and cross-sections.

Color Designation

Classification according to color - a most critical factor in the building-ornamental-monument stone industry - is in four divisions:

- dark red
- medium red
- light red
- pink

Color variations are not sharp but typically gradational, and they tend to be generally extensive rather than patchy or blotchy on a small scale (i.e. in terms of inches).

Fractures

Considerable effort was made to distinguish between core fractures of a primary nature from those that have been induced as a consequence of the drilling operation. Fractures which can be matched and fitted according to the irregularities of the fracture surface and also have a chloritic-biotite layer or coating of rust are unquestionably of a primary origin. Fractures with a fresh, unstained appearance, are fairly planar and oriented perpendicularly to the length of the core are clearly of a secondary (induced) nature. Then there is a small percentage (possibly 10 to 20 percent) of fractures where the interpretation leaves some doubt. Rounded, abraded ends on

pieces of core, indicating differential rotation of adjacent core lengths, could be related to either primary or induced fractures.

Orientation of major fractures, particularly those showing chloritic partings or bleached alteration, is of considerable importance in terms of attempts to correlate fracture surfaces between cored holes. The data given on fracture orientation can be taken as a guide, however, some uncertainty remains in regard to the deduced orientation, so that conclusions must be somewhat tentative.

Foliation

Sluice site number one on the Chipewyan Red Granite was selected for detailed mapping and then core drilling on the basis of uniformity of deep color and mineralogy, widely spaced joints, and a high degree of massive texture, i.e. poorly developed or an absence of foliation. Hence, much of the core was of the desirable massive or nearly massive texture and resulted in some difficulties in establishing core orientation.

Mineral 'Defects'

Irregularities or 'impurities' that are undesirable from the point of view of either esthetics or weathering properties received careful attention and have been entered in the core logs. Veins, lenses, patches or other concentrations of either quartz, pegmatite, or mafic (dark) minerals were particularly noted. Pyrite (FeS_2) is undesirable insofar as it tends to produce a rust stain upon weathering and hence even trace amounts were noted in the core logs.

Drill Results

Core recovery was very good, in the order of 95 to 99 percent, allowing a good evaluation of geological factors, including fracture type and frequency. All drill-core

data are systematically recorded in logs in Appendix I. Two cross-sections are presented (Figs. 1, 2, 3) which show the principal geologic character of the cores.

(a) Texture

The core shows about the same textural variation and proportions as expected from outcrop examination, i.e. mainly medium-grained rock with 5 percent or less each of fine- and coarse-grained phases. The fine- and coarse-grained phases are typically in poorly defined 'bands' or zones 3 to 12 inches wide that are spaced 3 to 10 feet apart. The textural gradation is subtle, with diffuse boundaries, such that these variations will likely have little or no impact on cut and finished building stone slabs.

(b) Color

A little more variation is evident in the core than is to be seen on the partially leached outcrop surface. The color variation is present as a range in shades of red and color boundaries are gradational. Color variations generally tend to be local and occur as irregular, indistinct bands in the order of a few inches thick and spaced 2 to 5 feet or more apart. They are not likely to be tolerated in finished slabs for building stone applications.

(c) Fractures

The frequency and orientation of fractures are one of the keys to a successful building stone quarry operation. The six vertical drill holes have effectively established the nature and distribution of flat or gently dipping fractures. Most

of these fractures are interpreted as decompressional phenomena related to unroofing of the presently exposed granite (i.e. the gradual removal of overlying cover rock by erosion in the course of geologic time leads to lowering of confining stresses and expansion of the near-surface granite by development of fractures parallel or sub-parallel to the topographic surface).

There is a higher concentration of bedding fractures (quarryman's terminology for flat to gently dipping fractures, including sheeting) than has been noted in many of the granite quarries at comparable depths recently visited by the author in Quebec. Building stone quarry faces from 100 to 150 feet high invariably show a marked decrease in the frequency of bedding fractures with depth from surface. Bedding fracture spacings of 10 to 25 feet are not uncommon at depths of 100 to 150 feet.

Drill cores from C-4, C-3 and C-6 show greatest promise in the drill-site area for the development of granite blocks of building stone dimensions. Sections of these cores show bedding fractures spaced 3 to 5 feet apart particularly towards the lower end of the drill holes. (The longest single piece of core is 14 inches, from C-6.) Two vertical sections through the drill holes have been constructed (Figs. 1, 2 and 3) in an attempt to compare both rock type variations and the bedding fractures. Variations in rock character are either too local or too irregular to allow correlations to be made between these drill holes which are spaced in the order of 15 to 35 feet apart.

Attempts to correlate bedding fractures between drill holes were equally unsuccessful and one can only conclude that the higher elevation, northerly two drill holes (C-1, C-2) show the greatest frequency of bedding fractures. Hence, the drill core information points to the best building stone fracture condition being found in the southern two-thirds of the designated "commercial appearing granite" (Fig. 4).

The frequency and distribution of vertical fractures ('headers') with depth is also important from the standpoint of quarry planning and performance and still remains an uncertainty at this time; (horizontal drill holes would be needed for this evaluation). However, the surface fracture pattern is encouraging and frost wedged large blocks (3 x 4 x 6 feet) on gully walls makes the production of suitably sized building stone blocks look feasible.

The distribution of fractures as revealed in the six cored holes suggests a greater spacing of bedding fractures with increasing depth as also noted at the granite quarries in Quebec. Wider spacing of bedding fracture is therefore expected beyond the presently explored 25 foot drill depths. The bedding fracture frequency indicated in the vertical sections should be regarded as being towards the liberal side (the log data on fractures is likewise liberal in the interpretation, i.e. a possible over emphasis) although there is little available experience or knowledge to call on in terms of the correlation of fracture data from drill cores with that from adjacent building stone quarry faces.

(d) Foliation

The core shows a foliation character ranging from poorly developed to massive, with a tendency towards the latter. Typically, it is unusual to find a well-developed quartz-rodged lineation - foliation in the core, and the foliation is easily read only where the dark mineral (chloritic biotite) content is noticeable (rarely). In the granite building stone industry where a noticeable lineation - foliation is present it is usual to cut slabs so that any textural streaky character is minimized. The textural-fabric conditions evident in the Chipewyan granite should not present any unusual problems in this regard.

(e) Mineral 'Defects'

The granite is relatively free from quartz and pegmatite patches and bands, dark mineral blebs and streaks, and pyrite, in the cores of the four southern holes (C-3, C-4, C-6, C-7). Most of the minor amounts of quartz, pegmatite, chloritic seams and rare pyrite crystals occur in the two northern cores (C-1, C-2) which are of least importance because of their high incidence of bedding fractures and location towards the northern extremity of the designated "commercial appearing granite" (Fig. 4).

Conclusions and Outlook

The limited drill-core program has indicated the presence of prospective building stone quality granite in the southern two thirds of the designated "commercial appearing granite" (Fig. 4).

The designated area of good rock is elongate in shape (38-50 x 75 feet), with a possible southern extension to a total of 125 feet confined between two north-trending faults (Fig. 4). Building stone grade granite is not expected to be proven laterally (across strike) closer to these faults because of: - increased frequency of N-S shear-fractures, quartz veins and lenses, discoloration, and mafic streaks and bands, all of which seem to be related to the proximity of these faults. The incidence of defects and fractures carefully mapped in the outcrop of this sluiced area shows that building stone grade material does not underlie the outcrop surface adjoining to north or south sides of the 'commercial appearing granite.' However, better quality and suitable rock could occur either to the north or south at depth (possibly at 10 to 20 feet from surface).

Present exploration results indicate that a suitable granite of building stone grade underlies a minimum area of 40 x 100 feet, i.e. in short, it is a prospective "good small deposit," but with little chance for major extensions.

A relatively easy initial side-hill quarry operation can be envisioned insofar as about 40 feet of local relief is present, with access from the downhill south side (profile, Fig. 4). With this approach very little waste rock need be removed before good rock should be encountered.

Mr. Bev Haselton of Beebe, Quebec, reports that this granite does not appear to have any preferred directions of splitting, i.e. the directions of rift, grain and hardway usually encountered in granite building stone quarries are not evident.

The size limitations of the potential deposit were discussed with Mr. Haselton and as a result a local reconnaissance exploration was subsequently undertaken on foot in search of a second building stone site with major tonnage potential (i.e. an order of magnitude greater).

A site was located some 800 feet to the north of the drill site (sluice site number one), and clearing and sluicing of site number two was undertaken in the late fall, 1975, under the direction of M.N. Rogan, geologist, Alberta Research Council. Winter snow blanketed the area immediately after the sluicing operation and prevented geological mapping and evaluation of site number two. Preliminary indications are that careful mapping and evaluation will be needed. Spring, 1976, should see further progress in this respect.

Recommendations for future drill-core evaluations of building stone sites

1. Vertical drill holes be extended to depths of about 50 feet.
2. Drill holes be spaced 10 to 20 feet apart, preferably in the 10 to 15 foot range.
3. A combination of 2 inches and 1 3/8 inches diameter core should be drilled, possibly in a ratio of 1:2 drill holes respectively.
4. At least the upper 2 or 3 core barrel lengths of core should be scribed for core orientation.

References

- Godfrey, John D., (1971): Ornamental and building stones, Fort Chipewyan, Alberta;
Res. Coun. Alta. Intern. Rept., 24 p.
- Godfrey, John D., (1972): Fort Chipewyan ornamental-building stone project,
Chipewyan Red Granite; Res. Coun. Alta., Intern. Rept., 22 p.
- Nevin, A.E. (1975): Report on field work testing of red granite deposit, Fort Chipewyan,
Alberta; July 31, 1975; 12 pages.

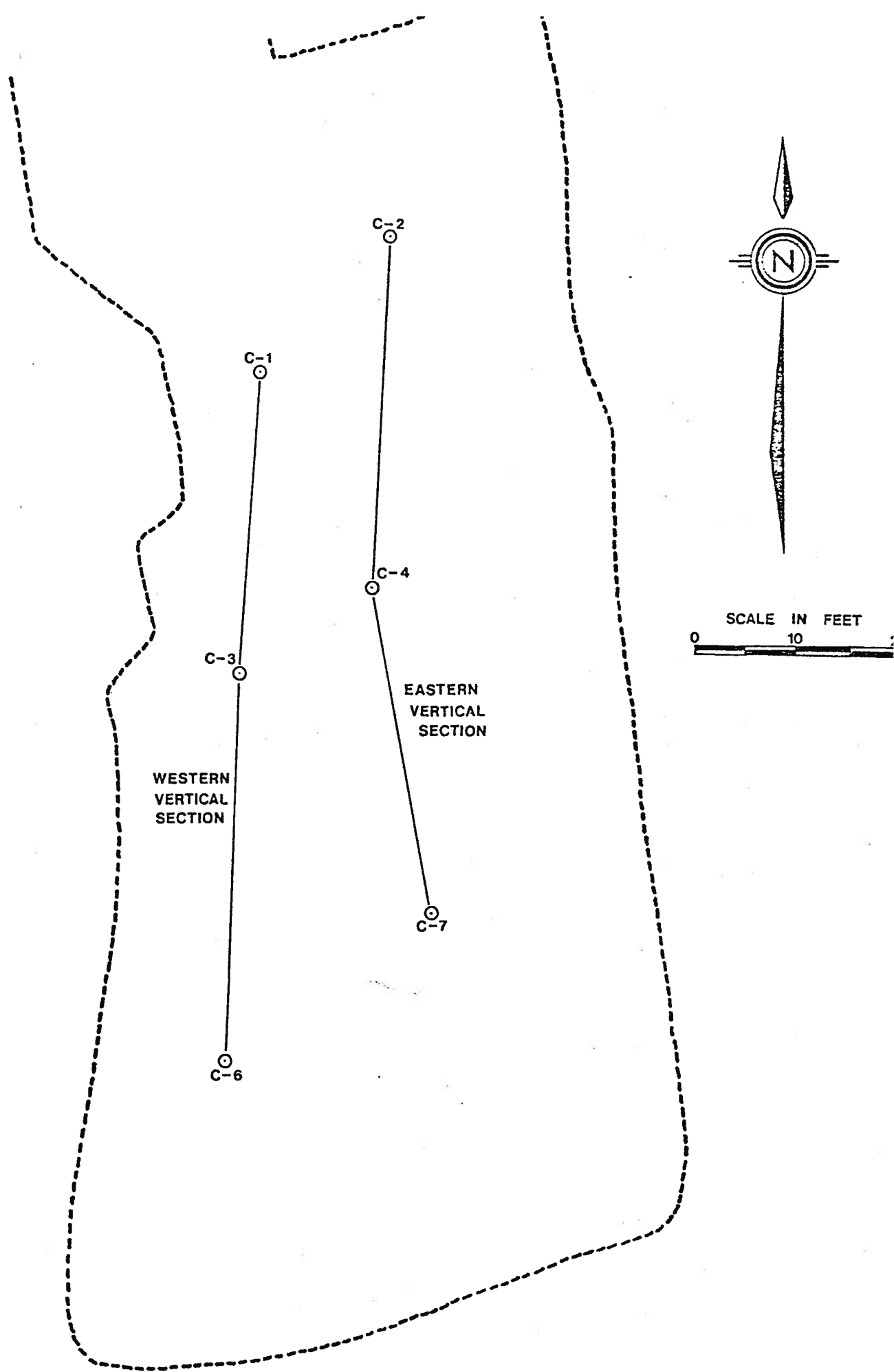


FIGURE 1. VERTICAL SECTION ALIGNMENTS THROUGH DRILL CORE HOLES

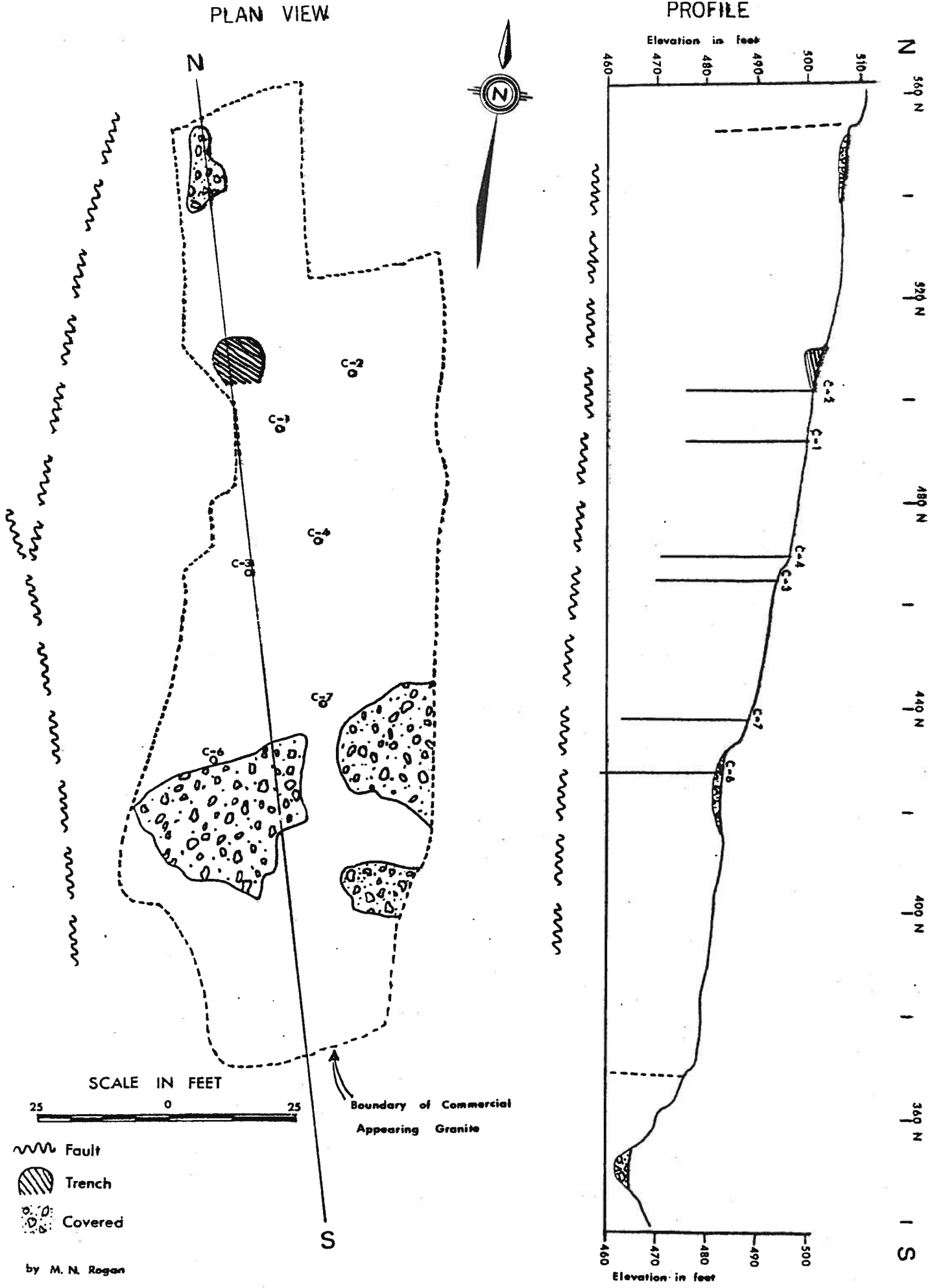


FIGURE 4. PLAN AND PROFILE OF POTENTIAL COMMERCIAL GRANITE AREA

APPENDIX 1

DRILLCORE LOGS

LEGEND TO CORE LOGS, FORT CHIPEWYAN BUILDING STONE PROJECT

Color: R - dark red
M - medium red
L - light red
P - pink

Letters in brackets indicate an intermediate color.
i.e.: M (L) is a color between medium red and light red but with emphasis towards medium.
Letters separated by a dash indicate a transition.
i.e.: M-L is a medium red color progressing to a light red color.

Texture: F - fine grain
M - medium grain
C - coarse grain

Letters in brackets indicate an intermediate grain size.
i.e.: M (C) is a medium-grain rock bordering on the coarse grain side.
Letters separated by a dash indicate a transition.
i.e.: M-C is a medium-grain rock progressing to coarse grain.

Mafic Minerals Distribution

random grain \equiv random orientation: indicates individual grains evident only, and are distributed evenly throughout.

blotchy: many individual grains grouped together to form a mafic aggregation.

streaky: grains or blotches smeared or streaked out discontinuously.

gneissic: distinct banding of mafic and light minerals.

All angles measured from the horizontal in degrees and are true dip.

Abbreviations

brn - brown
bte - biotite
chl - chlorite
dissem - disseminated
dk - dark
fd - feldspar
gm - green
lge - large
pk - pink
por - porphyroblast
py - pyrite
qtz - quartz
tr - trace

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C1								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
0.00														
	M	M	1	random grain	1		uniform with some quartz blotches							
0.13								0.13	5°			X		X
	M (brn)	M-C	1	random grain oriented	<1	30°	uniform with some quartz blotches							
0.44								0.44	5°			X		X
	M	C-M	1-2	random grain oriented		50°	uniform with almost pegmatitic quartz							
0.91								0.91	5°			X		X
	M (brn)	M (C)	2	random grain & blotchy		40°	uniform with quartz blotches							
1.35								1.35	flat			X		X
	M (brn & dk grn)	M (C)	2	mainly blotchy	tr	30°	uniform with quartz blotches							
1.75								1.75	5°			X		X
	M (brn-grn)	(F) M (C)	2+	blotchy to streaky		35°	uniform peg: @ 2-15' 55° 3/4"							
2.41								2.41	20°		X		X	
	M (brn-grn)	F-M	2	random grain oriented		35°	uniform							
2.62								2.62	flat			X		twist
	M (brn-grn)	F-M (C)	1-2	random grain oriented		35°	uniform							
2.82								2.82	0°			X		X
	M	M	2	random grained oriented & streaky		35°	uniform							
3.01								3.01	25°	tr chl	X		X	
	M	M	1-2	random grain oriented		40°	uniform							
3.16								3.16	10°		tr	X		X
	M	M (C)	2	random grain to streaky		40°	uniform with quartz blotches and streaks							
3.65								3.65	35°		X		X	
		C	1-2	blotchy			uniform with 1" quartz blotches							
								3.83	20°					

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

2.

COREHOLE: C1							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
3.83								3.83	20°		tr	tr	X	
	M	C (M)	1	random grain			Uniform, grading to Peg: 4.06' - 1"							
4.06								4.06	flat			X		X
	M	C-M	1-2	random grain oriented		35°	uniform, grading from peg: -- 1"							
4.42								4.42	5°			X		twist
	M (brn)	M	1-2	random grain oriented		40°	uniform							
4.66								4.66	40°		tr	X		X
	M (brn)	M	2	random grain oriented		40°	uniform							
4.90								4.90	25°		X		X	
	M (grn)	M (C)	2+	random gr oriented to streaky & blotchy		40°	uniform with large qtz blotches 1"-1 1/2"							
6.09								6.09	25°			X		X
	M (grn)	M (C)	2+	random gr oriented to streaky & blotchy		45°	uniform with some quartz blotches 1/2"-1"							
6.48								6.48	flat			X		X
	M	M (C)	2	random grain to blotchy orientation		35°	uniform with some quartz blotches 1 1/2"-1"							
7.29								7.29	10°		tr	X		X
	M (pk)	M (C)	1-2	random gr oriented to streaky & blotchy		45°	uniform with streaky quartz blotches 1"-1 1/4"							
7.51								7.51	20°			X		X
	M	M	2	random gr to streaky & blotchy		30°	uniform							
7.67								7.67	20°		X		X	
	M	M	2	random grains to streaky		40°	uniform							
7.87								7.87	0°			X		twist
	M	M	2+	random grains to streaky		35°	uniform with 3/8" lens of mafic (F) material ??							
8.12								8.12	10°		tr	tr	X	
	M	M	1-2	random grain to streaky	<1	30°	uniform							
								8.33						X

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

3.

COREHOLE: C1								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
8.57								8.57	5°			X		X
	M	M	1-2	random grains to blotchy	tr	40°	uniform							
9.30								9.30	20°		X		X	
	M	M	1-2	random grains to blotchy	1	35°	uniform							
10.07								10.07	40°		X		X	
	M	M	1	random grains to blotchy	1	25°	uniform							
10.55								10.55	20°			X		X
	M	M	1	random grains to blotchy		45°	uniform							
10.67								10.67	30°		X		X	
	M (pk)	M	2	random grains to streaky		45°	uniform, faint gneissosity							
10.85								10.85	20°	some chl	X		X	
	M (grn)	M (F)	2	random grains		45°	uniform							
11.05								11.05	20°		tr		X	
	M (grn-brn)	F (M)	1-2	random grains oriented	<1	35°	uniform							
11.22								11.22	25°		tr	tr	X	
	M (brn)	M (F)-C	1-2	random grains oriented	2	40°	large quartz blotches to quartz streaks: 1" - 1 1/2"							
11.79								11.79	15°		X		X	
	M (brn)	C-M	1-2	random grains	<1	30°	uniform							
12.28								12.28	30°			X		X
	M	C-M	1-2	random grains	<1	30°	uniform							
12.51								12.51	30°		tr	tr	X	
	M	M	2-	random grains oriented		25°	uniform							
13.17								13.17	10°			X		X
	M	M	2	random grains oriented to streaky		35°	uniform							
								13.01	5°			X		X

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

4.

COREHOLE: C1								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
13.81								13.81	5°			X		X
	M	M	1	random grains		35°	uniform							
13.92								13.92	5°	little chl	X		X	
	M (dk red)	M	2	random grains to blotches		35°	uniform							
? 17.72								17.72	0°			X		X
	M	M (F)	1	random grains		30°	uniform							
15.03								15.03	50°	hematite	X		X	
	M	F (M)	1	random grains		50°	uniform							
15.20								15.20	flat			X		twist
	M	M-F-M	1-2	random grains to streaky		40°	uniform; fine 1/2" lens @ 16.00'							
16.07								16.07	10°	chl	X		X	
	M	M (F)	1-2	Random grains to streaky		50°	uniform							
16.37								16.37	20°		X		X	
	M	M	1-2	random grains to streaky		40°	uniform							
16.75								16.75	15°		tr	X		X
	M	M (F)	1-2	random grains to blotchy		55°	uniform with slight F lensing							
17.43								17.43	5°			X		X
	M	M-F	1-2 to 5	from random grains to gneissic		40°	uniform; grade to a gneiss (F) and mafic							
18.65								18.65	20°	chl	X		X	
	M (grn-brn)	M (F)	3+	streaky		30°	uniform							
18.75								18.75	25°		tr	X	X	
	M; (grn-brn)	M (F)	3+	streaky near gneissic		40°	uniform; somewhat banded							
18.91								18.91	10°			X		X
	M; (brn)	M (F)	2	streaky near gneissic		35°	uniform; but banding more defined							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

5.

COREHOLE: C1								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
19.28								19.28	15°			X		X
	M	M (C)	2	random grain oriented to blotchy		30°	uniform with some quartz blotches							
20.09								20.09	25°	tr chl	X		X	
	M	M (C)	1-2	blotches		30°	??							
20.44								20.44	70°	hematite	X		X	
	M	M	1-2	blotches		35°	uniform							
20.73								20.73	5°			X		X
	M	M	1-2	random grains		45°	uniform							
20.90								20.90	5°			X		X
	M	M	2	streaky-random grain	<1	35°	uniform							
21.13								21.13	5°		tr	X		X
	M	M (C)	2	blotches		40°	uniform, with little concentrations of mafics 1/2" long - 1/4" wide							
21.40								21.40	80°	chl	X		X	
	M (brn)	M (F)	2	blotches and random grains		25°	uniform, lensing of F (+ mafic)							
21.83								21.83	0°			X		X
	M	M-C	2+	blotches and random grains		35°	uniform, grading slight to peg.							
22.17								22.17	75°	tr chl	X		X	
	M (brn)	C-M	2	blotches		35°	uniform, from C-M in quartz							
22.36								22.36	0°			X		twist
	M (brn)	M (C)	1-2	random grains and blotches		35°	uniform							
23.25								23.25	flat			X		twist

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C2								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
0.00														
	M	M	2	random grain oriented, streaky		50°	uniform	1.09	10°		tr	X	X	
1.09														
	M	M	2	foliated, random grain oriented		50°	uniform	1.35	0°			X		X
1.35														
	M	M	2±	random distrib.			uniform	1.38	10°		X		X	
1.38														
	M	M	1-2	random distrib.			uniform	1.44	30°		tr	tr	X	
1.44														
	M	M					uniform	1.73	0°	tr biot	X		X	
1.73														
	M	M (C)	2+	single grain random			uniform	2.42	flat		v. little	X		X
2.42														
	M	M C	1	blotchy		15-30°	uniform	2.92	flat-5°			X		X
2.92														
	M	M	1-2	granules-foliated fo random		30°	uniform, with random quartz blotches	3.31	0°			X		X
3.31														
	M	M	1	random (F)		35°	uniform, with minor irregular pegmatite @ 90° 1/4"	3.74	10°	tr chl	X		X	
3.74														
	M	M	1-2	one foliation layer		75°	quartz foliation 20°	4.21	5°			X		X
4.21														
	M	M	1-2	granular (foliation)	secondary	85° 30°	uniform, with minor 1" quartz blotch & minor irr. pegmatite	4.28	0°	?		?		
4.28														
			1	random grains			Peg. @ 70° 1/2" qtz fol. 45°							X

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

7.

COREHOLE: C2

								FRACTURES						
			MAFIC MINERALS		%	FOLIA.	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	SURFACE			INTERP.			
FOOT.	COLOR	TEXTURE	%	DISTRIBUTION				GARNET	ANGLE	FOOT.	ANGLE	MAFIC	RUSTY	FRESH
4.49								4.49	5°		minor		X	
	M	M	1	random										
4.58								4.58	5°			X		X
	M	M (F)	1	random			minor irregular pegmatite							
4.73								4.73	<5°			X		X
	M	M	1	random grains			faint quartz foliation 50°							
4.91								4.91	5°			X		X
	M	M	1-2	faint foliation, single grains			uniform							
5.23								5.23	5°			X		X
	M	M	2	random grains to blotchy			uniform							
5.45								5.45	25°		X		X	
	M	M (C)	2+	random elongated grains - oriented	slightly		uniform							
5.66								5.66	0°			X		X
	M	M	2	oriented slightly, some blotches			uniform							
5.84								5.84	5°			X		X
	M	M (C)	2+	streaky (slight) to blotchy			uniform, with minor quartz blotch 1/2"							
6.03								6.03	0°			X		X
	M	F-M (C)	1-2	random grain oriented			fine almost lense like grains - to minor pegmatite							
6.48								6.48	20°	sl. chl.	X		X	
	M	F-M-C	2+	random gr oriented, blotches in peg			feldspar plagioclase 3"							
7.50								7.50			X	little	X	
	M	M (F) (C)	2+	random grains			narrow (1") F grain band							
8.03								8.03	5°			X		X
	M	M	1	random grains			1/2" quartz blotches							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

8.

COREHOLE: C2							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
8.16	M	F-M	1-2	random elongated grains - oriented		50°	1 1/2" F band, random pattern	8.16	5°		X	little	X	Twist off
8.74	M	M	1-2	grains oriented		45°	uniform	8.74	5°		X	little		
9.07	M	M (C)	2	grains oriented		40°	uniform - minor 1" pegmatite	9.07	5°		X	little	X	
9.41	M	M (C)	2	grains oriented		40°	coarsening of quartz blotches	9.41	10°			X		X
9.58	M	M	2+	blotchy and sl. oriented		40°	uniform	9.58	5°			X		X
9.77	M	F-M	2+	blotchy and elong. - random grains		45°	1 1/2" F band (random)	9.77	10°		little	X		X
10.14	M	M (F)	1	random grain to blotchy			uniform	10.14	5°			X		X
10.28	M	F-M (C)	1	random grain to blotchy			Slight F localization and quartz blotches 1/2"	10.28			X	little	X	
10.47	M	M (C)	1-2	random grained - slightly oriented		35°	Quartz coarsening to blotches uniform	10.47	0°			X		X
10.77	M - touch of brn	M (F)	2-	almost streaky		50°	uniform, F lensing	10.77	15°	chl.	X		X	
10.88	M	M	1-2	random grains slightly oriented		35°	uniform	10.88	0°			X		X
11.13	M - touch of brn	M (F)	2	random grains slightly oriented		40°	uniform, quartz in blotches	11.13	0°			X		X

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C2								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
15.28								15.28	10°		little	X		X
	M	M - rough surface	1-2	random grained		30°	uniform							
15.50								15.50	15°	little chlorite	X	little	X	
	M	M (C)	2	blotchy to streaky		40°	uniform - quartz blotches 1/2"							
15.69								15.69	0°		little	X		X-twist
	M	M	1	random grained	1	40°	uniform							
16.08								16.08	30°		little	X		X
	M	M	1-2	random grained oriented	trace	45°	uniform							
16.35								16.35	0°			X		X
	M	M	1	random grained	trace		uniform							
16.43								16.43	0°			X		X
	M	M	1	random grained	1		uniform							
16.62								16.62	5°		little	X		X
	M	M	1	random grained oriented	<1	35°	uniform							
16.92								16.92	10°		little	X		X
	M	M-F	2	streaky to blotchy	<1	40°	uniform - fine gn phase (2 1/2") with green discoloration around garnet 17.50' - some minor sulfide							
17.69								17.69	5°		little	X		X
	M	F	2	peppery			uniform							
17.79								17.79	15°		little	little	X	
	M	F-M	2	random grained to blotchy	<1	35°	uniform - 2 1/2" band F							
18.45								18.45	10°		little		X	
	M	F-M	2	random grained to blotchy	<1	35°	uniform - some coarsening of quartz							
18.65								18.65	5°			X		X
	M	M	1-2	random grained to blotchy		35°	uniform							
18.80								18.80	0°			X		X-twist

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C2							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
18.80								18.80	0°			X		X-twist
	M	M	1	random grained	<1		uniform - slight coarsening of quartz							
19.00								19.00	10°			X		X
	M	M	1	random grained	<1		uniform							
19.21								19.21	0°			X		X
	M	M	1-2	random grained to blotchy	1		uniform							
19.86								19.86	10°		little	v. little	X	
	M	M	1	random grained to blotchy	<1		uniform							
20.09								20.09	0°			X		X
	M	M	1	random grained	<1		uniform							
20.48								20.48	0°			X		X-twist
	M	M	<1	random grained			uniform							
20.51								20.51	75°	little chl.	X		X	
	M	M	<1	random grained	trace		uniform							
20.87								20.87	10°			X		X
	M	M	1-2	random grained to blotchy			uniform							
21.38								21.38	5°		X		X	
	M	M	1	streaky to blotchy	<1		uniform							
21.75								21.75	20°	hematite	X		X	
	M - light patches	F (C)	2	streaky to blotchy	<1	45°	varies from F to M - (C) and somewhat pegmatitic							
22.29								22.29	55°	some hem.	X		X	
	M L (blchy)	M (C)	2	blotchy			larger feldspars - change of color - blotchy							
22.53								22.53	25°	some hem.	X		X	
	M - sl brn tinge	M	1-2	random grained to blotchy			uniform							
22.70								22.70	15°		X		X	

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

13.

COREHOLE: C3

								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
0.00								0.00						
	L	M	2+	random blotches		35°	uniform							
0.17								0.17	15°			X		X
	L	M	2+	random blotches		25°	uniform							
0.64								0.64	5°			X		X
	L	M	2+	random blotches	<1	30°	uniform							
1.74								1.74	0°			X		X
	L	M	2	random blotches	1		uniform	1.75	85°	hemitized chloritic	X		X	
2.72								2.72	0°			X		X
	L (P)	M	2	random blotches		25°	uniform							
3.48								3.48	15°	yellow stain	X		X	
	P	M	1-2	random blotches			uniform - minor sulfides							
3.58								3.58	25°	yellow stain	X		X	
	P	M	2	random grains and blotchy		40°	uniform - trace sulfides							
3.93								3.93	15°			X		X
	P	M	2	random grains and blotchy		30°	uniform - minor sulfides							
4.27								4.27	5°			X		X
	P-L(P)	M-F	1-5	random grains streaky and gneissic		35°-50°	uniform - changes at 4.5 ft i.e. P to LP and M to F - minor sulfides							
4.87								4.87	5°			X		X
	P	F	3	streaky-gneissic		25°	uniform							
5.00								5.00	20°		little		X	
	P-L-P	F (M)	5	gneissic		35°	uniform							
5.30								5.30	5°			X		X
	P- green tinge	F (M)	5	gneissic		25°	uniform - slight banding of mafics - minor sulfides							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C3

							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
5.81								5.81	15°		X		X	
	P (L)	F (M)	5	gneissic		20°	uniform - slight banding of mafics							
6.48								6.48	10°		little		X	
	P (L)	F (M)	4	streaky		40°	uniform - slight banding of mafics							
6.66								6.66	0°		little	little		X ?
	L (P)	F (M)	3	streaky		30°	uniform							
6.86								6.86	20°		little		X	
	L	M (F)	2	random grains and some streaky		35°	uniform - gneissic and mafic banding end at 7.2 ft							
7.41								7.41	10°			X		X
	L (M)	M	1-2	random grains and blotchy		20°	uniform							
7.66								7.66	30°		little	little		X
	M (L)	M	2	random grains and blotchy		40°	uniform							
8.57								8.57	75°	hematite	X		X	
	M (L)	M	1	random grains and blotchy		40°	uniform							
8.75								8.75	flat			X		X
	M (L)	M	1	random grains and blotchy		40°	uniform							
9.10								9.10	flat			X		X
	M (L)	M	1	random grains and blotchy	<1	35°	uniform							
9.27								9.27	20°			X		X
	M	M	1	random blotches	trace		uniform							
9.38								9.38	flat					
	M	M	1	random blotches			uniform							
9.52								9.52	flat			X		X

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14.

COREHOLE: C3								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
10.27								10.27	80-90°	chl	X		X	
	M	M	1	random blotches		45°	uniform							
10.96								10.96	flat			X		X
	M	M	1	random blotches		30°	uniform							
11.27								11.27	0°					
	M	M	1	random blotches		40°	uniform							
11.48								11.48	0°			X		twisted
	M	M	1	random blotches	<1	35°	uniform with trace of pyrite							
12.10								12.10	0°			X		
	M	M	1	random blotches	1	40° ?	uniform							
12.39								12.39	10°			X		X
	M	M	1	random grain & blotched	1	30°	uniform							
12.98								12.98	5°			X		X
	M	M	1	random grain & blotched	<1	45°	uniform							
13.40								13.40	75° (2)		X		X	
	M	M	1	random grained & blotched	tr	35°	uniform							
13.51								13.51	30°		tr		X	
	M	M	1	random grained & blotched	1	45°	uniform							
14.11								14.11	10°			X	X	
	M	M - F	<1	random grained & blotched	tr	25°	uniform							
14.41								14.41	20°			X		X
	M	F - M	tr	random grained		35°	uniform							
14.80								14.80	5°			X		X
	M	M	1-2	blotched to streaked		35°	uniform	14.87				X		X

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C3

								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS			SURFACE			INTERP.	
			%	DISTRIBUTION				FOOT.	ANGLE	MAFIC	RUSTY	FRESH	PRI.	IN.
14.92								14.92	20°			X		X
	M	M	tr	blotched		55°	uniform							
15.14								15.14	10°			X		X
	M	M	<1	blotched to streaky	<1	30°	uniform							
15.85								15.85	5°			X		X
	M	M	1	random grain to blotched	<1	30°	uniform							
16.24								16.24	5°			X		twisted
	M	M	<1	random grained to blotched	tr	25°	uniform							
16.65								16.65	10°			X		X
	M	M	<1	random grained to blotched	<1	35°	uniform							
17.54								17.54	15°			X		X
	M	M - F		random grained to streaky		35°	uniform							
18.27								18.27	5°			X		twisted
	M	F (M)	1		tr	35°	uniform							
18.65								18.65	15°			X		X
	M	M	1-2		1	40°	uniform							
19.35								19.35	20°			X		X
	M	M	1		<1	30°	uniform							
19.56								19.56	10°			X		X
	M (L)	M	<1		tr	45°	uniform	19.70	85°	hem & chl	X		X	
20.12								20.12	90°					
	M	M	1-2			25°	uniform							
20.43								20.43	5°		X		X	
	M	M	1			30°	uniform							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C4							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
0.00								0.00						
	M	C-M-F	<1	blotchy	<1		none, cs qtz blebs, a f gr band							
0.16								0.16	10°			X		X
	M	M (F)	<1	random grain		55°	1/2" f gr band, of same comp, qtz blotches 1% + py dissem. f gr part darker							
0.55								0.55	10°		trace	trace		X
	M	M (F) - M	<1	random grain	tr	35°	grades from f gr to m gr, chgs from darker to lighter in color							
0.74								0.74	20°			X		X
	M	M - F	<1	random grain	tr	50°	grades from med - f gr						X	X
1.00								1.00	20°			X		X
	M	F	tr	random grain	<1	45°	uniform f gr							
1.09								1.09	20°	tr hem	trace		X	
	M	F - M	tr	random grain	<1	35°	grades from f - med gr							
1.41								1.41	25°			X		X
	M	F - M	tr	random grain	tr	45°	uniform f grain, 1/2" med band tr py							
1.47								1.47	30°			X		X
	M	F - M	<1	random grain	tr		grades from f-med gr, py along fracture							
1.60								1.60	10°	tr hem (py)	trace		X	
	M	F - M	tr	random grain	<1	45°	fine gr with 1/2" med gr bands, qtz blebs							
1.77								1.77	25°	yellow stn	trace		X	
	M	F - M	tr	random grain	<1	40°	uniform f gr with tr py							
1.89								1.89	10°	tr hem	X		X	
	M	F	tr	random grain	tr	40°	uniform w py along fracture							
1.98								1.98	20°	tr hem (py)	X		X	
	M	F-M (C)	tr	random grain & blotches		35°	grades from f gr-med gr with cs qtz blotches, py dissem							

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19.

COREHOLE: C4								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
2.23	M	M	tr	random grain & blotches	tr	40°	uniform, m-gr, 1% py	2.23	15°			X		X
2.33	M	M	tr	random grain & blotches		45°	uniform, 1%+ py dissem, rodded qtz	2.33	10°		tr	tr	X	
2.55	M	M (C)	1	random grain & blotches		35°	f gr intercolated material, 2% py dissem	2.55	15°			X		X
3.33	M	M (C)	tr	random grain & oriented			uniform m gr with tr py	3.33	15°			X		X
3.52	M	M	<1	random grain & oriented		40°	uniform with py along fracture	3.52	flat			X		twist
3.71	M	M	<1	random grain & oriented		50°	uniform with 1%+ py	3.71	0°			X		X
3.87	M	M (C)	<1	random grain to streaky	tr	35°	uniform with py along fracture some yellow stain	3.87	10°			X		X
4.05	M	C (M)	<1	random grain to blotchy	<1	45°	uniform with dissem py 1%+	4.05	flat			X		twist
4.25	M	M (C)	<1	random grain to blotchy		45°	uniform with dissem py 2%	4.25	flat			X		twist
4.40	M	M - C	<1	blotchy to streaky	<1	40°	rare lem porph, some gr sz chge	4.40	25°			X		X
4.94	M	M	<1	blotchy to streaky		45°	uniform with yellow stain assoc with chl	4.94	5°			X		X
5.32	M	M (C)	tr	random grain		40°	uniform with yellow stain assoc with chl	5.32	30°	tr chl	X		X	
	M	M (C)	tr	random grain		40°	uniform with yellow stain assoc with chl	5.40	80°	chl				

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COREHOLE: C4								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
5.44								5.44	25°		chl	X	X	
	M (L)	M (C)	<1	random grain		40°	mafic absent in cs gr part							
6.02								6.02	5°	tr hem	tr	X		X
	M	M	<1	random grain to blotches	tr	45°	uniform							
6.62								6.62	30°	chl	X		X	
	M	M	<1	random grain to blotches	tr	40°	uniform							
6.73								6.73	25°	tr chl	X		X	
	M	M	<1	random grain to blotches	tr	40°	uniform with tr py along fracture							
6.96								6.96	25°		X		X	
	M	M	<1	random grain			uniform							
7.04								7.04	10°			X		X
	M	M	<1	random grain	tr	50°	uniform							
7.20								7.20	5°			X		twist
	M	M	<1	random grain to blotches	tr	35°	uniform							
8.11								8.11	flat			X		X
	M	M	<1	random grain to blotches	<1	35°	uniform							
8.97								8.97	10°			X		X
	M	M	<1 - 1	random grain to blotches		50°	uniform with dissem py <1% at beginning, mafics less as one proceeds							
10.66								10.66	20°			X		X
	M	M	1	random grain to blotches	<1	30°	uniform							
11.08								11.08	20°		tr		X	
	M	M	1	random grain to blotches	<1		uniform							
11.10								11.10	10°		tr		X	
	M	M	1	random grain to blotches		50°	uniform							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C4

								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
11.61								11.61	0°			X		X
	M	M	1	random grain to blotches	tr	40°	uniform							
11.94								11.94	10°			X		X
	M	M	1	random grain to blotches		35°	uniform							
12.10								12.10	20°		tr		X	
	M	M	1	random grain to blotches		40°	uniform							
12.79								12.79	10°		tr	tr		X
	M	M	1	random grain to blotches		40°	uniform							
13.29								13.29	20°			X		X
	M	M	1	random grain to blotches		45°	uniform							
13.71								13.71	10°		tr		X	
	M	M	1	random grain to blotches		50°	uniform							
13.81								13.81	15°		X		X	
	M	M	<1	random grain to blotches		40°	uniform							
14.11								14.11	5°			X		X
	M	M	<1	random grain to oriented		45°	uniform							
14.28								14.28	0°			X		X
	M	M	<1	random grain to oriented		45°	uniform							
14.43								14.43	5°		tr		X	
	M	M	<1	random grain to oriented		40°	uniform	15.30	85°		tr		X	
15.55								15.55	0°		X		X	
	M	M	<1	random grain to blotches		40°	uniform							
15.82								15.82	20°			X		X
	M	M	<1	random grain to blotches		40°	uniform							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C4								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
16.68								16.68	15°			X		X
	M	M	<1	random grain to blotches		40°	uniform							
16.80								16.80	80°			X		X
	M	M	<1	random grain to blotches		45°	uniform							
17.15								17.15	20°		X		X	
	M (L)	M - C	<1	random grain		45°	uniform to cs gr peg with no mafic							
17.99								17.99	flat			X		X
	L	C	tr	random grain		50°	peg with m gr rock							
18.43								18.43	5°			X		X
	M	M	<1	random grain to oriented		45°	uniform m gr							
19.13								19.13	flat			X		chipped
	M	M	<1	random grain to oriented		40°	uniform							
19.85								19.85	5°			X		X
	M	M	<1	random grain to oriented		40°	uniform							
20.57								20.57	flat			X		X
	M - M (L)	M	<1	random grain to oriented		35°	uniform							
20.86								20.86	5°			X		X
	M (L)	M (C)	<1	random grain to blotches		40°	uniform							
21.17								21.17	5°			X		X
	M (L)	M (C)	1	blotchy to streaky		40°	uniform with py assoc with bte							
21.87								21.87	30°			X		X
	L	M	<1	random grain to blotchy		45°	uniform							
22.29								22.29	flat			X		X
	M	M	1	blotchy		45°	uniform							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C4								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
22.52								22.52	15°		X		X	
	M - L	M - F	<1-4	blotched to gneissic	tr	65°	uniform when not gneissic							
23.02								23.02	15°	tr hem	X		X	
	M (L)	M (F)	4	gneissic		60°	uniform gneissic							
23.24								23.24	5°		X		X	
	M - L	M (F) - M	3-1	gneissic to blotched		40°	uniform	23.95	70°	chl +	X		X	
24.12								24.12	25°		X		X	
	L	M	<1	blotchy to streaky		45°	uniform	24.15	75° (2)	chl	X		X	
24.50								24.50	u broken up along fracture					
	L	M	1	blotched to streaky			uniform, chl in fractures							
24.97								24.97	flat			X		twist
	L	M	<1	blotched to streaky			uniform						X	twist
25.10								25.10	flat				X	twist
	L	M	<1	blotched to streaky			uniform						X	twist
25.20								25.20	flat				X	twist
	L	M	<1	blotched to streaky		40°	uniform						X	twist
25.37								25.37	flat				X	twist
	L	M	<1	blotched to streaky		45°	uniform						X	twist
25.50								25.50	flat				X	twist

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C6								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERF.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
0.00														
	w/brn & M grn tinge	M	1	random grain oriented to blotches	<1	40°	uniform							
0.54								0.54	15°			X		X
	M	M	1	random grain oriented to blotches	<1	25°	uniform, with some clustering of qtz							
1.69								1.69	0°			X		X-twist
	M	M	1	random grain oriented to blotches	<1	40°	uniform, with some clustering of qtz							
2.39								2.39	flat			X		X
	M	M	1	random grain oriented to blotches	<1	55°	uniform, with coarsening quartz blotches							
3.20								3.20	flat			X		X
	M	M	1	random grain oriented	<1	50°	uniform - minor pyrite							
3.48								3.48	0°			X		X-twist
	M	M	1	random grain oriented	<1	40°	uniform							
4.07								4.07	10°		little	X		X
	M	M	1	random grain to blotches	<1	35°	uniform							
4.68								4.68	15°		little	little	X	
	M	M	1	random grain to blotchy	tr	45°	uniform							
4.95								4.95	15°			X		X
	M	M	1	random grain to blotchy	tr	30°	uniform							
5.23								5.23	10°			X		X
	M	M	1-2	random grain to streaky	tr	45°	uniform							
5.55								5.55	10°		little	little	X	
	M (L)	M	1-2	random grain to streaky	tr	50°	uniform							
6.32								6.32	5°			X		X
	M (L) - M	M	1	random grain to streaky	tr	40°	uniform							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

25.

COREHOLE: C6								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
6.62								6.62	15°		tr	X		X
	M	M	<1	random grain to streaky	<1	45°	uniform							
7.21								7.21	70°		X		X	
	M	M	<1	random grain oriented		45°	uniform							
7.38								7.38	flat			X		twist
	M - M (L)	M	1	random grain oriented to streaky		55°	uniform							
7.58								7.58	15°		X		X	
	M	M	<1	random grain oriented to streaky		50°	uniform with <1% py along fractures							
7.67								7.67	5°			X		X
	M	M	<1	random grain oriented to streaky		45°	uniform with dissem py 1%							
7.88								7.88	flat			X		twist
	M	M	<1	random grain to blotchy		40°	uniform							
8.12								8.12	flat			X		twist
	M	M	<1	random grain to blotchy		40°	uniform with dissem py along fracture							
8.69								8.69	15°		tr	tr	X	
	M	M	<1	random grain to blotchy		40°	uniform with py 1%							
8.83								8.83	10°		X		X	
	M	M	<1	random grain to blotchy	<1	50°	uniform							
9.28								9.28	5°			X		X
	M - M (L)	M	<1	random grain oriented to blotchy		50°	uniform							
9.51								9.51	5°			X		X
	M (L)	M	<1	random grain oriented to blotchy	<1	45°	uniform with <1% py							
10.02								10.02	0°		X		X	
	M	M		random grain oriented to blotchy	<1	50°	uniform with 1%+ py							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C6

							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
10.31								10.31	10°		X		X	
	M	M	<1	random grain oriented to blotches	<1	50°	uniform							
11.19								11.19	10°			X		X
	M-M(L)	M	<1-2	random grain oriented to blotches		50°	higher mafics with gneissic bit, a Qtz cluster tr of py in bte							
11.61								11.61	5°			X		X
	M(L)	M(F)	1-2	streaky to gneissic	tr	45°	uniform gneissic							
11.98								11.98	5°		tr	tr	X	
	M	M	1	random grain to streaky		40°	uniform with 1/2" gneissic band							
12.28								12.28	5°		tr	tr	X	
	M	M-M(F)	1	random grain to blotchy	tr	50°	uniform with 1/2" gneissic band							
12.47								12.47	5°				X	twist
	M	M	<1	random grain to blotchy	tr	40°	uniform							
13.38								13.38	15°		X		X	
	M	M	1	random grain to blotchy		40°	uniform							
13.47								13.47	10°		tr	tr	X	
	M	M	tr	random grain to blotchy			uniform with py							
13.58								13.58	0°		tr	tr	X	
	M	M	tr	random grain to blotchy		45°	uniform with py 1%?							
13.72								13.72	flat			X		twist
	M	M	<1	random grain to blotchy		50°	uniform							
13.82								13.82	5°		tr	tr	X	
	M	M	<1	random grain to blotchy	tr		uniform with tr py							
14.05								14.05	flat			X		twist
	M	M	<1	random grain to blotchy			uniform with 2% py							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C6								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
14.28								14.28	flat			X		X-twist
	M	M	1	random grain to blotchy	<1	50°	uniform							
14.64								14.64	5°		X		X	
	M	M	1	random grain to blotchy	1	50°	uniform							
15.04								15.04	0°			X		X
	M-M(L)	M	1	random grain to blotchy	tr	55°	uniform							
15.28								15.28	0°			X		X
	M(L)	M	1	random grain to blotchy	tr	35°	uniform							
15.45								15.45	5°			X		X
	M(L)-L	M	1	random grain to blotchy	tr	45°	uniform - some quartz blotches							
15.65								15.65	20°		X		X	
	M(L)	M	1	random grain to blotchy	<1	50°	uniform							
15.72								15.72	0°		little		X	
	M	M	1	random grain to streaky	tr	45°	uniform							
16.11								16.11	15°			X		X
	M	M	1	random grain	tr	40°	uniform							
16.40								16.40	10°			X		X
	M	M	1	random grain	<1	45°	uniform - some qtz blotches (1/4")							
17.16								17.16	5°			X		X
	M-M(L)	M	1	random grain	tr	40°	uniform							
17.63								17.63	10°			X		X
	M(L)	M	<1	random grain	1	60°	uniform							
18.22								18.22	10°		little	X		X
	M	M	1	random grain	1-2	45°	uniform							
								19.33	flat			X		X

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C7								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
0.00								0.00						
	M	M	<1	random grain to blotches	tr	30°	uniform							
0.32								0.32	20°		X	tr		X
	M	M	<1	random grain to blotches	tr	40°	uniform							
0.70								0.70	10°			tr	tr	X
	M	M	<1	random grain to blotches	tr	45°	uniform with tr py							
0.96								0.96	55°		X			X
	M (L)	M	<1	random grain to blotches		55°	uniform with <1% py							
1.64								1.64	5°		X	tr		X
	M (L)	M	<1	random grain		50°	uniform							
1.79								1.79	flat				X	twist
	M	M	<1	random grain to blotches		45°	uniform							
2.40								2.40	10°			tr	tr	X
	M (L)	M	<1	random grain oriented	tr	40°	uniform							
2.65								2.65	10°				X	X
	M - M (L)	M	<1-1	random grain oriented		35°	uniform with dissem py ? 1% +							
3.02								3.02	10°		X	tr		X
	M	M	<1	random grain oriented		45°	uniform							
3.26								3.26	10°				X	X
	M	M	<1	random grain oriented	<1	35°	uniform							
3.40								3.40	0°				X	twist
	M	M	<1	random grain oriented	tr	45°	uniform							
3.81								3.81	5°				X	X
	M	M (F)	<1	random grain to blotches		40°	uniform with tr py							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C7								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
3.95								3.95	0°		tr	tr	X	
	M	M (F)	<1	random grain to blotchy		35°	uniform							
4.01								4.01	10°		tr	tr	X	
	M	M (F) - M	<1	random grain to blotchy	tr	40°	uniform							
4.59								4.59	0°			X		X
	M	M	<1	random grain to blotchy		50°	uniform						X	X
4.81								4.81	15°				X	
	M	M	1	blotchy to random grain to streaky		40°	uniform with <1% py							
5.17								5.17	40°		X		X	
	M - M (L)	M	<1	blotchy to random grain to streaky		45°	uniform with odd fd por							
5.86								5.86	30°			X		X
	M - L	M - C	<1	blotchy to streaky		45°	uniform with yellow stain throughout							
6.67								6.67	45°	chl	X		X	
	M (L) - M - R	C - M (C)	<1	streaky to blotchy		25°	uniform with yellow stn in 1st fracture							
6.96								6.96	5°			X		X
	R - M (L)	M (C) - M	1	streaky to blotchy	tr	40°	uniform with tr hem							
7.24								7.24	5°			X		X
	M (L) - L	M - C	tr	blotchy to random grain		40°	have qtz clusters, & odd fd por							
7.69								7.69	5°		X	tr	X	
	M	M - C	1	blotchy to random grain		40°	lge fd por							
7.95								7.95	75°	tr chl	X		X	
	M	C - M (C)	<1	random grain		50°	lge fd por with qtz cluster							
8.10								8.10	0°			X		X
	M	M (C) - M	tr <1	random grain		45°	lge fd por with qtz cluster is uniform with the end							

FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C7								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
8.90								8.90	5°		X		X	
	M	M-M (F)	<1	random grain	tr	35°	uniform							
9.34								9.34	10°			X		X
	M	M	<1	random grain		35°	uniform							
9.52								9.52	10°			X		X
	M (grn-brn)	M (F)	<1	random grain to streaky		40°	uniform with tr py							
9.95								9.95	30°			X		X
	M (grn-brn)	M (F)	1	random grain to streaky		35°	uniform							
10.06								10.06	25°		X		X	
	M (grn-brn)	M (F)	2	random grain to streaky		40°	uniform							
10.56								10.56	15°		tr		X	
	M (grn-brn)	M (F)	2	random grain to streaky		40°	uniform							
11.29								11.29	0°			X		X
	M (grn-brn)	M (F)	tr	random grain to streaky		25°	uniform							
11.40								11.40	30°		tr		X	
	M (grn-brn)	M	<1	random grain to blotchy		35°	uniform							
11.63								11.63	flat			X		X
	M (grn)	M	<1	random grain to blotchy		35°	uniform							
11.93								11.93	5°		X		X	
	M (grn)	M	<1	random grain to streaky	tr	45°	uniform							
12.66								12.66	10°			X		X
	M	M	<1	random grain		40°	uniform							
13.42								13.42	0°			X		X
	M	M		random grain	tr	40°	uniform with tr py							

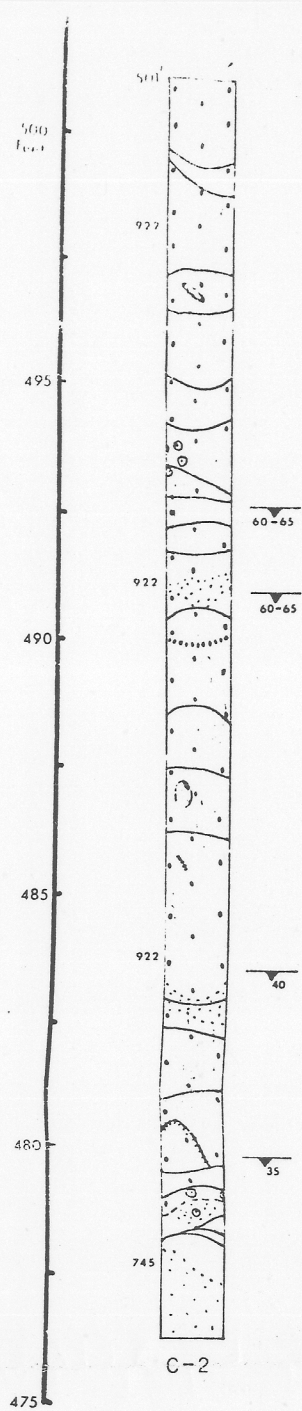
FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C7								FRACTURES						
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
13.59								13.59	flat			X		twist
	M	M	<1	random grain		35°	uniform with tr py							
13.82								13.82	0°			X		X
	M	M	<1	random grain		35°	uniform							
13.93								13.93	20°		tr	tr	X	
	M	M	<1	random grain	tr	50°	uniform							
14.11								14.11	flat			X		X
	M	M	<1	random grain		35°	uniform with 1% py along fracture							
14.41								14.41	flat			X		twist
	M (grn)	M - M (F)	<1	random grain	tr	40°	uniform							
14.59								14.59	3°		X		X	
	M (grn)	M - M (F)	1	random grain	tr	30°	uniform							
14.67								14.67	0°		X		X	
	M (grn)	M (F) - M	1	random grain to streaky		50°	some gneissic areas							
15.15								15.15	0°			X		X
	M (grn)	M (F) - M	1	random grain to streaky		35°	some gneissic areas							
15.57								15.57	10°		X		X	
	M - P	M - M (F)	1-2	gneissic to random grain orientation	<1	50°	contact between f gr gneissic part & m gr part, 2% py	15.85	85°	bte			X	X
16.44								16.44	0°			X		X
	P	M	<1	random grain		45°	uniform with 1% py							
16.74								16.74	5°		X		X	
	P - L	M	<1-1	random grain		30°	uniform							
17.30								17.30	25°			X		X
	L - M (L)	M	1	stretched to gneissic	<1	55°	uniform							

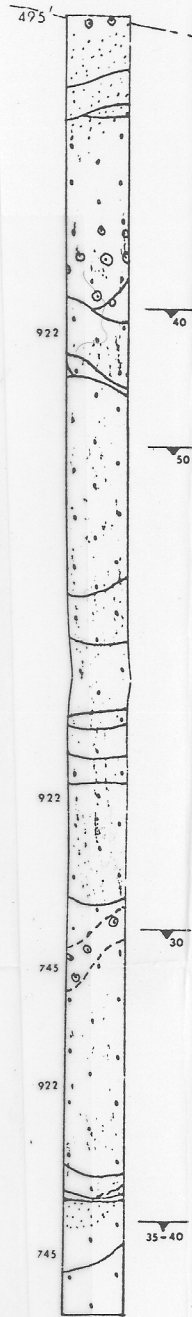
FORT CHIPEWYAN BUILDINGSTONE CORE LOG

COREHOLE: C7							FRACTURES							
FOOT.	COLOR	TEXTURE	MAFIC MINERALS		% GARNET	FOLIA. ANGLE	LITHOLOGY DESCRIPTION, PEGMATITES AND VEINS	FOOT.	ANGLE	SURFACE			INTERP.	
			%	DISTRIBUTION						MAFIC	RUSTY	FRESH	PRI.	IN.
17.80								17.80	flat			X		X
	M	M	1	streaky to blotchy	tr	40°	uniform with qtz clusters, partially gneissic							
18.18								18.18	15°			X		X
	M	M	1	random grain to blotchy	<1	40°	uniform							
18.62								18.62	0°			X		X
	M	M	<1	random grain to blotchy	<1	40°	uniform with qtz clusters							
19.03								19.03	40°		tr		X	
	M	M	<1	random grain to blotchy		25° ?	uniform							
19.12								19.12	5°		tr		X	
	M	M	tr	random grain to blotchy	tr	30°	uniform							
19.25								19.25	5°		tr		X	
	M	M	<1	random grain to blotchy		25°	uniform with <1% py along fractures							
19.48								19.48	0°			X		X
	M (grn)	M	<1	streaky to random grain	<1	35°	uniform							
19.69								19.69	60°		X		X	
	M (grn)	M	<1	random grain to blotchy	tr	35°	uniform							
20.48								20.48	10°	yellow	X		X	
	M	M	<1	random grain	<1	30°	uniform							
21.08								21.08	10°		X		X	
	M	M	tr	random grain		40°	uniform							
21.28								21.28	5°			X		X
	M	M	<1	random grain	tr	40°	uniform							
21.49								21.49	0°			X		X
	M	M	<1	random grain	<1	40°	uniform							

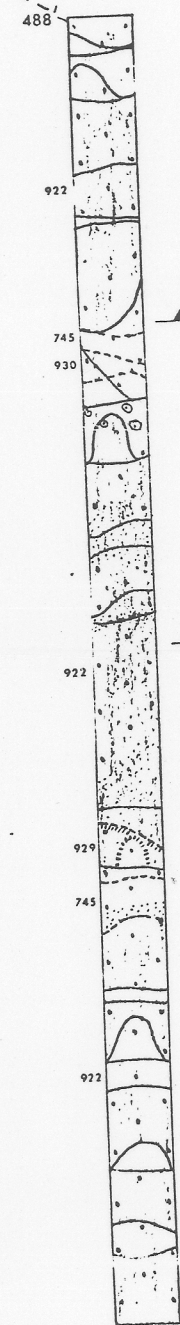
CROSS SECTION OF EASTERN DRILL HOLES



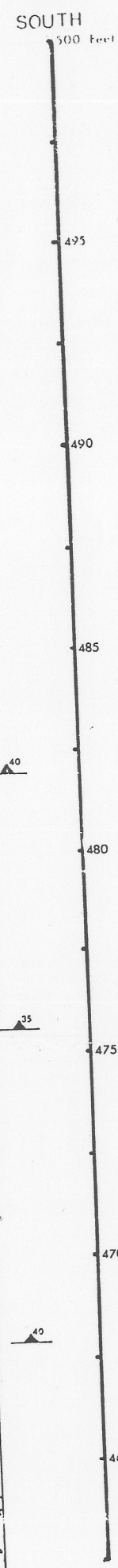
C-2



C-4

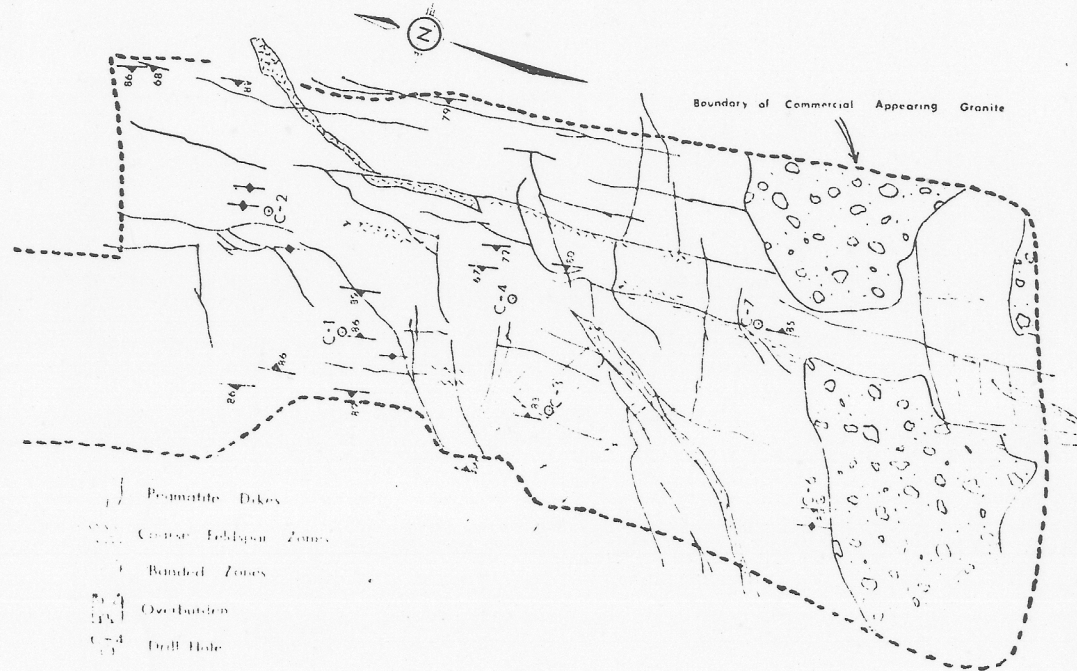


C-7



GEOLOGY AND DRILL HOLE LOCATION MAP

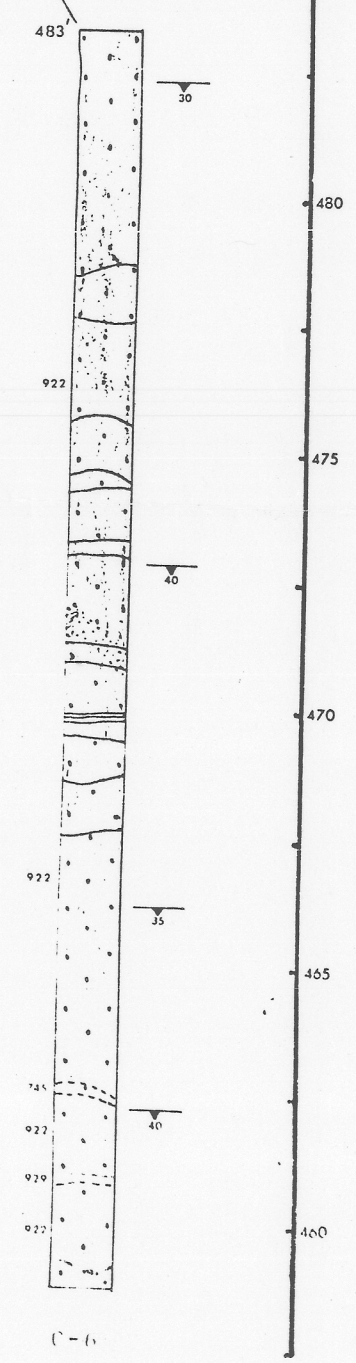
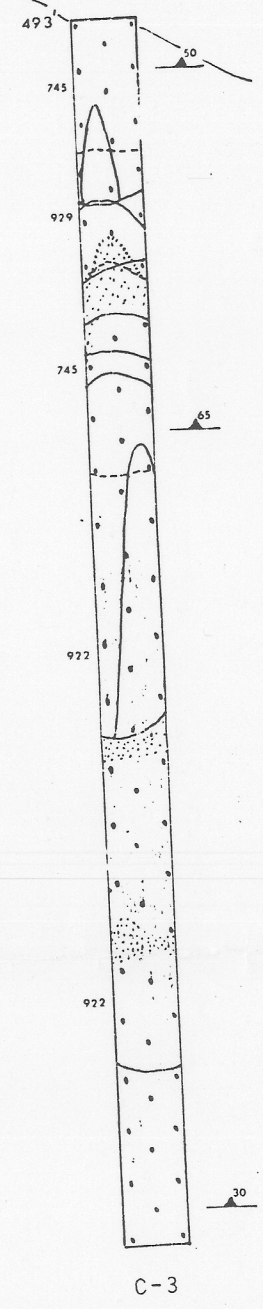
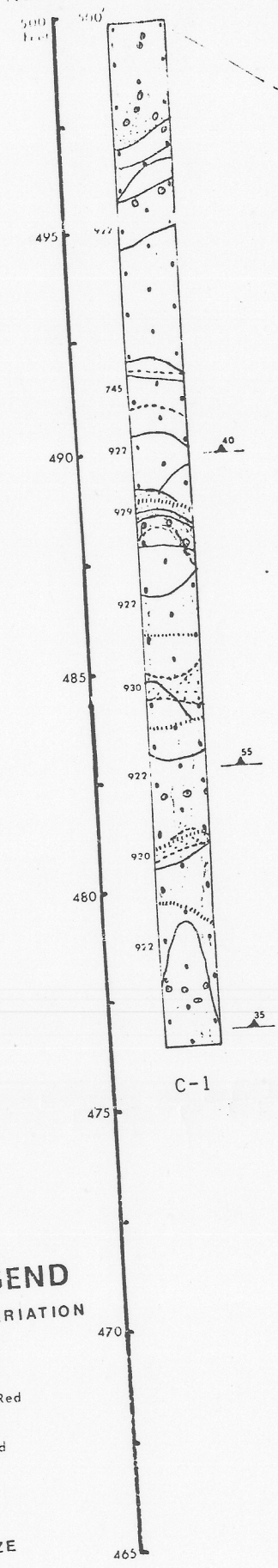
SCALE 1"=16.4'



- Pegmatite Dikes
- Coarse Feldspar Zones
- Banded Zones
- Oxidation
- Drill Hole
- Granite Location

Cross Section of Western Drill Hole

NORTH



LEGEND

- COLOR VARIATION
- 930 Dark Red
 - 922 Medium Red
 - 745 Light Red
 - 929 Pink

- GRAIN SIZE
- Coarse
 - Medium
 - Fine

- Quartz
- Chlorite
- Fractures
- East Dip
- West Dip
- Color Boundary

SCALE
Vertical 1" = 20'
Horizontal 1" = 10'