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COGEMA CANADA LIMITED

DETAILED MAPPING and LITHOGEOCHEMISTRY RESULTS

- TRENCH #5 -

RECEIVED

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MILLING LANDS SECTION

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TABLE OF CONTENTS

		page
	SUMMARY OF RESULTS	
1.	INTRODUCTION	1
2.	LITHOLOGY	1
	Rhyolite / felsic tuff1Iron-rich tuff and dacitic tuff3Iron-rich tuff of southern section4Dacitic ashfall tuff of southern section4Rock alteration	
3.	LATE DYKE AND VEINING	5
	Diabase dyke	
4.	STRUCTURE	6
5.	LATE FRACTURES	6
6.	<u>GLACIAL STRIAE</u>	8
	REFERENCE	10

LIST OF FIGURES

Figure 1 : Location of camps and work sites, fall 1986 out stripping program. Scale 1:50 000	.crop 2
<u>Figure 2</u> : Histogram of late fracture orientations from trench 5 (azimuth only). Total number of observations is 113	7
<u>Figure 3</u> : Histogram of glacial striae directions measured trench 5 and compiled for all trenches. Total of measures is 35 at trench 5 and 78 for trench 1 through 5	lat number nes

SUMMARY OF RESULTS

Four different rock types are exposed at Trench 5. To the north, the rock consists of a massive to locally weakly foliated rhyolite or acid tuff. The central and southern part of the northern section is covered by an interbedding of iron-rich garnetiferous lapilli tuff to agglomerate and dacitic, locally garnetiferous ashfall tuff to agglomerate. The two small outcrops of the southern section consist of a dark green iron-rich tuff (locally with clasts) and of dacitic ashfall tuff. A diabase dyke, trending north-south, is exposed on the east margin of the outcrops.

The rocks are generally steeply north dipping with a strike ENE-WSW. Minor folds are common, the fold axes plunge gently to the east. Quartz veinings can be locally abundant with/without epidote. Generally quartz veins are slightly discordant compared to the foliation (angle between vein and foliation varies from 10° to 20°).

Sixteen samples were taken for chemistry and/or thin section. Nine samples are below the detection limit for Au (2 ppb). Five samples are between 4 and 11 ppb. One sample gives 110 ppb, it came from a locally strongly pyritiferous ashfall tuff. No whole rock analysis was done.

1. INTRODUCTION

Trench 5 consists of two parts, a northern part (outcrop GC-1) and a southern part (outcrop GC-2), ninety metres separate these two outcrops. This trench is located 350 metres north of the southern limit of the property and approximately 1.3 kilometres east of the Burntbush River (see Fig. 1).

This trench was mechanically stripped and cleaned during the 1986 fall program. Approximately 4400 metres² were cleared of trees and 2500 metres² of bedrock were exposed. Mapping was not performed at that time due to poor weather conditions. Work started again in July 1987 with the completion of the 5 x 5 metres grid and mapping of the outcrop.

In order to make the description easier, the different lithologies encountered will be discussed from north to south.

2. LITHOLOGY

Rhyolite / felsic tuff

This rock type consists of a very fine to fine grained, non-magnetic, massive to weakly foliated rhyolite flow or acid tuff. Colour varies from greenish to brownish to buff and white (the rock is white when there is no veining in the area) on the weathered surface; and bluish grey on the fresh surface.

In general, the rock has a massive aspect, but usually a weak foliation or banding is observed in hand specimen. The foliation orientation is quite variable but usually the dip is shallow, measurements are very difficult to take. The foliation is better developed near the quartz veins (might be related to the formation of veins) and close to the contact between this unit and the iron-rich tuff. Foliation measurements taken close to the contact have more or less the same orientation as the contact with a strong dip to the north. One possible explanation for the absence of foliation on the outcrop surface is that the foliation plane is parallel to the surface.

The presence in two areas of a dark green massive facies which might represent the undeformed equivalent of the well foliated iron-rich tuff was noted. This, the rhyolite/acid tuff, might correspond to the dacitic tuff.



<u>Figure 1</u> : Location of camps and work sites, fall 1986 outcrop stripping program. Scale 1:50 000

One thin section taken in 1986 from this unit gave 75% plagioclase, 5% quartz and zoisite and 10% opaques.

The contact between this unit and the iron-rich tuff is sharp and runs more or less N100°. It is very easy to follow, mostly because of the colour change and of a well defined foliation in the iron-rich tuff. The contact seems faulted. Foliations on both sides of the contact follow the direction of the contact.

Iron-rich tuff and dacitic tuff

These two rock types will be discussed together because in outcrop, they are often interbedded or closely related. Three sub-units were mapped based on the relative abundance of each unit: iron-rich tuff (lapilli to agglomerate), dacitic tuff (lapilli to agglomerate) or mixed tuff where there is a rapid interbedding of the two facies or where the rock seems to be a transition facies (especially on top of outcrop where the rock was originally exposed and covered by lichen: the composition seems to be intermediate between the two.

The iron-rich tuff is medium green on the weathered surface and dark greenish grey on fresh surface. Usually the rock is fine grained and well foliated with coarse grained almandine garnets. Garnets are almost everywhere, they have no specific orientation. On the weathered surface, this unit is spotted with small elongated rusty nodules (mm to cm size) with no associated magnetism (altered magnetite crystals). This unit is generally very rich in clasts of two types: one type of clast is biotite-rich brownish and it is weathering in comparison with tuff; the other type is whitish and does not weather in. The clasts are garnet and magnetite free. The clasts are flattened and elongated in the direction of foliation. The ratio length to width varies from 2:1 to more than 10:1. Looking at the clast distribution, one can deduce that the foliation is parallel to the bedding.

The iron-rich tuff is relatively more abundant than the dacitic tuff on the map. But the true importance of each unit is unknown. On a vertical face, the iron-rich tuff was overlain by dacitic tuff.

The dacitic tuff weathers light brown to buff and it is dark grey on fresh surface. The grain size is again fine to very fine with feldspar phenocrysts, the foliation is generally well developed. This tuff carries less clasts (same types as in iron-rich). Almandine garnets are locally observed but in lesser amount than in the iron-rich tuff. No rusty nodules are observed. Two thin sections were taken in this unit and have a very similar mineralogy plagio- clase-quartz-epidote-lepidomelane-chlorite and opaque. The texture observed in the slide is mylonitic to blastomylonitic.

Iron-rich tuff of southern section

This outcrop is dark green to olive green on the weathered surface and dark greenish grey on the fresh surface. The foliation/ schistosity is very well developed. This unit is very similar to the iron-rich tuff of the northern section but with some minor differences. The clasts are less abundant, they are observed in the eastern part of the outcrop. There is only one type of clast, white on weathered surface, massive looking. Here again the clasts are elongated and flattened. The foliation may be different from the bedding (using the clast distribution). Garnets are scarce, they are observed in 2 distinct areas. There is no interbedding with the dacitic tuff. Millimetric to centimetric elongated rusty nodules are present everywhere on the outcrop. According to a thin section taken in 1986, quartz and feldspar are the main constituents with biotite, chlorite and calcite, the texture is mylonitic.

The southernmost part of this outcrop has a different aspect; it looks like a transition facies between this unit and the dacitic unit exposed to the south. The strong glacial polish makes the interpretation more difficult because it tends to obliterate textures and relations.

Dacitic ashfall tuff of southern section

This dacitic ashfall tuff with feldspar phenocrysts is well foliated and is clast and garnet free and with a meter thick layer parallel to the foliation of a more massive buff coloured rock (reminiscent of the rhyolite/acid tuff of the northern section). No thin section was taken from this outcrop. Close to the iron-rich tuff there is again a transition facies but with a well developed glacial polish; the identification is very difficult.

Rock alteration

There is no major rock alteration in trench 5. The entire outcrop looks relatively fresh. Nevertheless there are some interesting points.

A local silicification is observed close to a sheared, pyrite-rich section of the lapilli tuff/agglomerate (sample T-5-1 was taken in this area and yields 110 ppb Au). Close to some quartz-epidote veins or patches, there is a minor epidotization of the host rock. There is also the transformation of iron oxides (magnetite) into rusty/ limonite nodules on the weathered surface of the outcrop.

3. LATE DYKE AND VEINING

Diabase dyke

A diabase dyke crosscuts the east part of the northern and southern sections of trench 5. The intrusive contact with the host rock is well exposed. The host rock did not undergo any major transformation (none observed at the macroscopic scale). There is a chill zone in the diabase with a thickness of less than fifteen centimetres. The true thickness of the dyke is unknown but it exceeds twenty five metres.

The dyke is strongly magnetic, massive looking and medium to coarse grained. Rare quartz veins and fractures crosscut the diabase but stop before reaching the host rock. In places there are inclusions of host rock fragments (approximately 50 centimetres long).

Some centimetric to decimetric offshots of diabase are found in the host rock. The diabase found in the westernmost part of the southern section is probably part of the ramification system.

Quartz veining

Quartz veins are not evenly distributed over the entire trench. There are areas where veining is very important and areas where veining is practically absent. For the mapping purpose, small quartz veins were not drawn.

Three major types of quartz veins are seen on the outcrop: quartzepidote \pm chlorite (chlorite may replace partially or completely epidote) or quartz alone; quartz-tourmaline veins are observed only in the iron-rich tuff of the southern section. Veins can be undeformed, folded or boudinaged. There are also at least two generations of veining and at least one older than the intrusion of the diabase dyke.

In the quartz epidote veins, quartz is in the center while epidote is forming the external envelope. In places, epidote extends in the host rock. Epidote alone can form small isolated veins, but this is a very minor type.

The general orientation of veins is East-West with a strong dip. In the northern section, veins are more or less concordant with the foliation whereas in the southern section, veins are making an angle of 10 to 20 degrees with the foliation (i.e. foliation at N80°, veins are between 90° and 100°). The vein thickness is usually less than thirty centimetres but veins with an observed thickness of one metre or more are described. Veins can be sterile or weakly mineralized (sulphides).

Foliation near the quartz segregations is very strongly disturbed and folded (centimetric/decimetric folding).

4. STRUCTURE

The intensity of deformation is variable from one end of trench 5 to the other end. Rhyolite/acid tuff of the northern section is undeformed. The only deformation observed in this area is located near the contact with the adjacent unit where there is a development of foliation parallel to the contact.

Deformation in the iron-rich and dacitic tuffs is also quite variable. The deformation is stronger than in the rhyolite/acid tuff. The degree of deformation can be visualized by the flattening and elongation of the clasts within the tuff (ratio length: width varying from 2:1 to 10:1). In thin section, the texture is mylonitic to blastomylonitic (GC-02-04).

Shearing observed in trench 5 is at a local (minor) scale, not comparable with the shearing observed at trench #2 (report 87-CND-47-01). The iron-rich tuff of the southern section shows the maximal shearing observed. Shearing increases towards in most cases, in the iron-rich and dacitic tuffs, foliation varies between N75° and N85° and it is steeply north-dipping (65°-85°). In rare cases, foliation is vertical or steeply south dipping.

Microfoldings observed in dacitic and iron-rich units (mostly associated with quartz veining) are similar or comparable to those observed in Trench 3 with an easterly direction of fold axes and a plunge of 25° or less. No stereographic projection of foliation or fold axes was done because of similarity with trench 3. Few lineations (folds lineation) were developed but no measurement was taken.

5. LATE FRACTURES

Fractures are oriented in all directions usually with a steep dip (most time not measurable). 16% of all fractures are between N10° and N55°; 23% are between 65° and 100°, and 60% of all fractures are between 100° and 180° (see Fig. 2). Some minor displacements are observed in places (<30 cm). Most fractures are bleached, the bleaching envelope is narrow.





Fracturing seems more abundant in the rhyolite/acid tuff than everywhere else. This impression may be caused by the absence of a well developed foliation. Fracturation in this unit forms long linear pattern. Fracturation in the iron-rich and dacitic tuffs is less obvious but here again, the pattern is the same.

In the iron-rich tuff of the southern section, fracturation is different. Instead of a long linear pattern, fractures are 10 centimetres long and they are evenly spaced and oriented over a major part of the outcrop. The strike varies from NO5°-N40°, dip is vertical. Most fractures are open, a few are healed with quartz.

6. GLACIAL STRIAE

Thirty-five (35) measures of ice direction were taken in trench 5 ranging from N125° to N195° with a maximum at N140° for the first set. The southeast ice direction was determined in one place by a rat tail feature. Another set (from an older glaciation) of three measures ranges from N245° to N255° (the southwest direction is inferred from regional knowledge) (see Fig. 3).

Glacial polish is well developed in low areas of outcrop especially in the southern part of the northern section (outcrop GC-01) and in the southern part of the southern section (outcrop GC-02).





REFERENCE

LEARN, John, 1986, Geological Mapping and Lithogeochemistry Results, Summer Field Program, Part II (Cogema Report No. 86-CND-47-02).

1986 Detailed Mapping and Lithogeochemistry Results of Outcrop Stripping Program (Cogema Report No. 87-CND-47-01).

SAMPLE STATISTICS TRENCH 5

Roch type and sample	Chem	<u>istry</u> *	<u>Thin section</u>				
numbers	Opt. A	Opt. B					
Dacitic and iron-rich tuffs							
ag 000	v		v				
GC-002	X		A				
66-003	A V		v				
GC-004	A V		A V				
GC-008	A V		Χ				
CC 011	л У						
T_{5-1} (pyrite)	л У		¥				
T5-1 (PJCICE)	А		x (2)				
13-3 AM 16 4	Y		A (2)				
RH-10-4	л						
Rhyolite/Acid Tuff							
AM-16-1	х						
AM-16-2	Х						
AM-16-3	Х						
<u>Diabase dyke</u>							
GC-001							
<u>Late veins</u>							
CC 005 (much heat goal)	v		v				
GC = 003 (much host rock)	A V		X				
GC=007 (with host fock)	A V		v				
TS_4 (much host rock)	л Y		A				
	л						
TOTALS:	<u>Opt. A</u>	<u>Opt. B</u>	Thin section				
Summer program 1986	8	0	× 4				
Fall program 1986	3	0	4				
Summer program 1987	4	0	0				
		·					
	15	0	8				
	1.5	v	0				

Opt. A = minor elements, CaO, K_2O , CO_2 Opt. B = major and minor elements

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rd	Station	Sample	no	Au ppa	Sb ppn	As ppm	Ва ррл	Cd ppm	Cs ppm	Cr ppm	Co ppm	Cu ppm	Eu ppm	Hf ppm	Ir ppm	Fe %	La ppm	Mo ppm	Ni ppm	Rb ppm	Sc ppm
19	60-2		0	11	-0.1	1	390	-5	i	-20	14	-9	2	3	-50	3.5	15	-1	-20	32	10.0
11	60-3		Û	7	0.1	1	220	-5	i	-20	10	-9	1	3	-50	5.2	9	-1	-20	25	8.9
12	GC-4		0	-2	0.1	1	390	-5	0	-20	14	-9	1	4	-50	5.1	15	-1	-20	26	13.0
13	60-5		Ō	-2	0.2	-1	150	-5	0	-20	9	-9	1	4	-50	3.0	13	-1	-20	15	13.0
14	SC-5		Ú	4	-0.1	-1	150	-5	1	23	14	-9	-1	4	-50	8.1	13	-1	~20	30	14.0
15	66-7		0	-2	0.3	2	91	-5	0	28	32	-9	1	3	-50	8,3	15	-1	23	-5	16.0
16	GC-8		0	-2	-0.1	1	250	-5	Û	40	16	-9	1	3	-50	3.5	10	-1	24	21	14.0
18	60-11		0	-2	0.3	-1	75	-5	0	35	15	-9	1	3	-50	6.6	18	-1	24	-6	15.0
18	T5-1		0	110	0.2	7	260	-5	1	25	18	-9	-1	4	-50	12.0	13	-1	29	21	14.0
19	T5-2		0	-2	0.4	3	- 50	-5	0	-20	11	-9	-1	4	-50	8.3	12	1	-20	-5	8.0
20	T5-4		I)	10	0.2	4	130	-5	1	32	12	-9	1	5	-50	12.0	14	-1	-20	14	14.0
58	AM-16-1		0	-2	0.1	-1	560	-5	1	100	-5	14	1	6	-50	2.3	19	2	-20	49	16.0
59	AM-16-2		0	6	0.2	-1	-50	-5	-1	110	27	13	-1	7	-50	8.8	25	-1	-20	-14	25.5
50	AM-16-3		0	-2	0.1	-1	230	-5	2	83	22	30	1	6	-50	10.0	18	-1	-20	30	20.1
51	AM-16-4		0	-2	-0.1	1	380	-5	1	120	9	28	-1	4	-50	2.2	10	1	-20	64	16,0

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e	i of BU	IRNT	BU	SH 1	MINOF	ELE	EMENT	rs >	>> ⊤F	RENCH	1 #5	<<	[87	/11	/26]	В				
ord	Hole no	Sample	no	Se pp e	Ag ppm	Ta ppm	Tb ppm	Th pp a	W ppa	U ppm	Yb ppm	Zn ppm	Ce ppm	Na 7	Sn ppm	Te ppm	Zr ppm	8r ppm	Lu ppm	Sa ppa
10	GC-2		0	-5	-2	-1	-1	1.7	1	0.3	-2	-100	-9	2.91	-9	-9	-9	-9	-9.0	-9.0
11	GC-3		0	-5	-2	-1	-1	1.3	1	0.3	-2	-100	-9	2.16	-9	-9	-9	-9	-9.0	-9.0
12	60-4		0	-5	-2	1	1	1.4	-1	0.3	3	-100	-9	2.22	-9	-9	-9	-9	-9.0	-9.0
13	GC-5		0	-5	-2	1	1	1.6	-1	0.3	2	-100	-9	2.07	-9	-9	-9	-9	-9.0	-9.0
14	60-6		0	-5	-2	-1	-1	1.5	-1	0.4	2	-100	-9	1.40	-9	-9	-9	-9	-9.0	-9.0
15	6C-7		0	-5	-2	-1	-1	1.7	-1	0.4	-2	-100	-9	1.40	-9	-9	-9	-9	-9.0	-9.0
16	GC-8		0	-5	-2	-1	-1	1.9	-1	0.4	-2	-100	-9	2.89	-9	-9	-9	-9	-9.0	-9.0
18	GC-11		0	-5	-2	-1	1	1.9	-1	0.4	-2	-100	-9	2.87	-9	-9	-9	-9	-9.0	-9.0
218	T5-1		0	-5	-2	-1	-1	1.9	-1	0.3	3	150	-9	2.17	-9	-9	-9	-9	-9.0	-9.0
219	T5-2		0	-5	-2	-1	-1	1.4	-1	0.4	-2	-100	-9	0.12	-9	-9	-9	-9	-9.0	-9.0
220	T5-4		0	-5	-2	-1	1	2.1	-1	0.5	3	620	-9	1.90	-9	-9	-9	-9	-9.0	-9.0
358	AM-16-1		0	-5	-2	1	1	1.5	-1	0.4	-2	110	38	2.64	-100	-10	-200	3	0.3	6.1
359	AM-16-2		Q	-5	- 4	1	2	2.2	-2	0.7	4	130	43	4.85	-100	-10	-510	2	0.6	7.3
360	AM-16-3		0	-5	-2	-1	1	1.8	-1	0.3	2	140	31	1.70	-100	-10	-200	-2	0.4	4.6
361	AM-16-4		0	-5	-2	-1	-1	2.3	-1	0.5	-2	-100	21	3.09	-100	-10	-200	4	0.2	2.4

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	COGEN	LA CANADA LIMIT	ED
	<u>BURNTBUS</u>	IRIVER	PROJECT
HAND SPECIMEN DI	ESCRIPTION		Sample No.: AM-16-1
l. <u>Mineralogy:</u>	%, habit, grain size:		
Too fir	ne grained for mineral	identification	n
Small (epidote nodules observ	ed	
<u> </u>			
			· · · · · · · · · · · · · · · · · · ·
			· · · · · · · · · · · · · · · · · · ·
2 Pook Toxturo	Colour Hordroog of		
2. <u>ROCK lexture</u>	, colour, Hardness, et	c.:	nadium anay an frach aunfas
		• • • • • • • • • • • • • • • • • • •	
			• •
3. <u>Structures:</u>		· · · · · · · · · · · · · · · · · · ·	• • •
3. <u>Structures:</u> Weakly	foliated		
3. <u>Structures:</u> <u>Weakly</u> 4. Alterations:	foliated	· · · · · · · · · · · · · · · · · · ·	
3. <u>Structures:</u> <u>Weakly</u> 4. <u>Alterations:</u> <u>Normal</u>	foliated rock weathering		
3. <u>Structures:</u> <u>Weakly</u> 4. <u>Alterations:</u> <u>Normal</u>	foliated rock weathering		
3. <u>Structures:</u> <u>Weakly</u> 4. <u>Alterations:</u> <u>Normal</u>	foliated rock weathering		
3. <u>Structures:</u> <u>Weakly</u> 4. <u>Alterations:</u> <u>Normal</u> 5. Magnetism:	foliated		
3. <u>Structures:</u> <u>Weakly</u> 4. <u>Alterations:</u> <u>Normal</u> 5. <u>Magnetism:</u> <u>Non mag</u>	foliated rock weathering		
3. <u>Structures:</u> <u>Weakly</u> 4. <u>Alterations:</u> <u>Normal</u> 5. <u>Magnetism:</u> <u>Non mag</u>	foliated rock weathering		

	COGEMA	A CANADA LIMITED
	<u>BURNTBUSH</u>	RIVER PROJECT
HAND	SPECIMEN DESCRIPTION	Sample No.: AM-16-2
1. <u>Mi</u>	ineralogy: %, habit, grain size:	•
	Very fine grained.	
	No mineral identified.	
	·····	
Ζ. <u>RC</u>	ock Texture, Colour, Hardness, etc	
	Buff coloured on Weathered Su	rrace; medium greenish grey on fresh surf
	Not very hard, can be scratch	ed by a knife.
	ructures:	
<u></u>	None observed.	
4. <u>Al</u>	lterations:	
	Normal weathering of the rock	: .
	agnetism.	
. <u></u>	Non magnetic	

	<u>COGEMA CANADA LIMITED</u>
	BURNTBUSH RIVER PROJECT
AND SPECIM	IEN DESCRIPTION Sample No.: AM-16-3
. Mineralo	gy: %, habit, grain size:
Ve	ry fine grained.
Di	fficult to guess the mineralogy because of grain size but chlorite
or	sericite is present.
No	sulphides.
**	
	
. Rock Tex	ture, Colour, Hardness, etc.:
. <u>Rock Tex</u> Da	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o
. <u>Rock Tex</u> Da	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o esh surface.
. <u>Rock Tex</u> Da fr We	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o esh surface. 11 foliated to schistose.
. <u>Rock Tex</u> Da fr We No	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o esh surface. 11 foliated to schistose. t very hard, can be scratched by a knife.
. <u>Rock Tex</u> Da We No	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o esh surface. 11 foliated to schistose. t very hard, can be scratched by a knife.
. <u>Rock Tex</u> Da fr We No . <u>Structur</u>	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o esh surface. 11 foliated to schistose. t very hard, can be scratched by a knife. es:
 <u>Rock Tex</u> <u>Da</u> fr <u>We</u> <u>No</u> <u>Structur</u> <u>Mi</u> 	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o resh surface. 11 foliated to schistose. t very hard, can be scratched by a knife. es: crofolding observed.
. <u>Rock Tex</u> Da fr We No 	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o resh surface. 11 foliated to schistose. t very hard, can be scratched by a knife. es: crofolding observed.
. <u>Rock Tex</u> Da fr We No Structur Mi	<pre>sture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o resh surface. 11 foliated to schistose. ot very hard, can be scratched by a knife. es: crofolding observed. ons:</pre>
 <u>Rock Tex</u> <u>Da</u> fr <u>We</u> <u>No</u> <u>Structur</u> <u>Mi</u> <u>Alterati</u> <u>Ru</u> 	ture, Colour, Hardness, etc.: rk green to green olive on weathered surface, dark greenish grey o resh surface. 11 foliated to schistose. rest very hard, can be scratched by a knife. es: crofolding observed. ons: sty alteration on the weathered surface.
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	Quartz-epidote (-chlorite) veins. & segregations
\sim	Quartz, quartz-epidote veins
	Epidote veinlets
SYMBOLS	· :
	Geologic contact, observed
40	Strike and dip of foliation (and bedding)
20	Azimuth and plunge of minor fold axis
He5 AH	Strike and dip of veins, vertical dip, dip direction known but not measured
	Strike and approximate dip of discrete fractures, vertical, inclined
11	Sense of movement
140	Orientation of glacial striae, ice direction inferred from regional knowledge
¥ T5-2	Sample location
$\int c c c c c c c c c c c c c c c c c c c$	Channel sample location
\sim	Limit of outcrop
	Water or overburden filled depression in outcrop exposure

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