GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORTS

> DATE RECEIVED DEC 1 3 1996

Assessment Report

on

the Basin Property

(Basin, Bent 1-5, ZeoBen 1-6 claims)

Geology, Prospecting and Analytical report.

NTS. 921 / 9W & 10E

Lat. 50°41"N

Long. 120°29"W



TABLE OF CONTENTS

1	Summary	p.1
2	Introduction	p.1
3	Location, Access and Physiography	p.1
4	Property and Ownership	p.1,2
5	History	p.2
6	Regional Geology	p.2
7	Property Geology and Prospecting	р.3,4
8	Analytical work	p.4,5
9	Conclusions and Recommendations	p.5
10	References	p.6

APPENDICES

A	p	pendix	1-	Analytical	Sheets
---	---	--------	----	------------	--------

- Appendix 2- Statement of Costs
- Appendix 3- Statement of Qualifications

LIST OF FIGURES

Figure 1-	Location Map	after p.1
Figure 2-	Claim Map	after p.1
Figure 3-	Regional Geology	after p.2
Figure 4-	Property Geology and Sample Locations	after p.2
Figure 5-	Detail of Geology, sample locations and stratigraphy "The Main Slide"	after p.2

٠

1. Summary

The Basin property covers an extensive section of lower Eocene Tranquille Fm. sediments and tuffs. These units have undergone regional zeolite facies metamorphism . Work in 1996 has discovered a signifigant resource of Na Bentonite within a particular unit of the Eocene sequence. The origin is still debatable but future work should focus on grades, logistics and potential markets. This property is particularly enhanced with favorable; topography, extensive dip-slope exposure of Na Bentonites, access and location proximal to the City of Kamloops and district. This is the first occurrence of Na Bentonite in B.C. and offers several promising "environmentally friendly" applications.

2. Introduction

This report summarizes geological mapping, prospecting and sampling on the Basin property. Analytical results are included of the sampling to date. Various tests including XRD, C.E.C., Ph, Wholerock and ICP are required to understand the chemistry of these deposits.

3. Location, Access and Physiography (Fig.1)

The property is located approximately 2 kilometers west of the City of Kamloops and its eastern borders connect to the western border of the city limits. The property is situated on the southern side of Kamloops lake with elevations from 400-800 meters. This low area covers desert conditions with a short winter November-March and extended summers with low rainfall and temperatures commonly in the +30 degrees centigrade. Cactus, sagebrush and a thin cover of grassland and Pine forest cover this area which has limited rangeland and forestry potential. Access is gained to most portions of the property via a number of range roads which can be accessed from the Trans Canada Hwy. or a gravel road from the Weyrhauser pulp mill.

4. Property and Ownership (Fig.2)

The Basin group consists of 31 contiguous units comprised of 11-2 post claims and 1-20 unit modified grid system claim for a total coverage of approximately 775 hectares. These claims are owned by L.C. Marlow and details are as follows:



l

¢.



Claim Name	Units	Tenure #	Expiry Date
Zeo Ben 1	1	340540	Sept.17,1997*
Zeo Ben 2	1	340541	Sept.17,1997*
Zeo Ben 3	1	340542	Sept.17,1997*
Zeo Ben 4	1	340543	Sept.17,1997*
Zeo Ben 5	1	340544	Sept.17,1997*
Zeo Ben 6	1	340545	Sept.17,1997*
Bent 1	1	340535	Sept.26,1997*
Bent 2	1	340536	Sept.26,1997*
Bent 3	1	340537	Sept.26,1997*
Bent 4	1	340538	Sept.26,1997*
Bent 5	1	340539	Sept.26,1997*
Basin	20	340534	Sept.28,1997*

* Expiry date pending acceptance of this report.

5. History

The property has seen relatively little previous exploration. The Afton mine is located approximately 1.5 kilometers due south of the Zeo-Ben 6 claim and this close proximity has resulted in some minor previous exploration for alkaline porphyry Au-Cu systems. Work includes limited soil sampling and the drilling of GG-1 and GG-6 drill holes just south of the Zeo-Ben claim line. These holes have no clear records but (L.Bond-pers com.) remembers 100's of meters of Tertiary sediments were the result of this drilling. More recently it was the recognition by L.C. Marlow of the Zeolite and bentonite potential in this Eocene sequence that led to the staking of the Basin group in the fall of 1995.

6. Regional Geology (Fig. 3)

The property is located within the intermontane belt of the B.C. cordillera. Basement rocks consist of Triassic-Jurrasic Nicola volcanics and coeval alkaline intrusives of the Iron Mask batholith. These intrusive rocks have seen extensive exploration for alkaline Cu-Au porphyry systems (ie. Afton and Ajax).

The Basin property is located within a large Eocene basin reportedly up to 2000 meters thick in this area (Ewing 1978). The basin property is situated over the the lower Tranquille beds which attain thicknesses of up to 500 meters. These are dominated by lacustrine, fossiliferous lake bed sediments with a varying tuffaceous component. These are occasionally interbedded with andesitic flows and lahars.



Geology of the Kamloops area. Nicola Group volcanic and sedimentary rocks underlie most of the map area. Picrite occurrences are shown in the stippled pattern.





This unit is overlain by a thick (to 1300 meters) succession of andesitic flows, flow breccias and lahars of the Dewdrop Flats formation. These formations are within a complex block faulted basin with complex internal faulting which must have been active during deposition as represented by rapid facies changes and internal facies variations.

7. Property Geology and Prospecting (Figs. 4 & 5)

In the fall of 1995 L.C. Marlow was intrigued by the appearance of well bedded and altered Eocene sediments in the area of the Basin property. The stratigraphic sequence is dominated by lacustrine sediments of varying composition that is part of the Tranquille formation. According to Ewing's 1978 work the section on the property consists of approximately 150 meters of the lower-middle portion of Tranquille formation with the lower portion of the formation not exposed and the Tranquille/Dewdrop contact eroded. These units while poorly exposed due to recessive nature of the sediments (~10% exposure), are extensive in nature due to the general dip slope nature on the property and a description of the sequence is as follows (from stratigraphic bottom to top):

Unit 1-Mudstone/Sandstone w/ minor tuffs

This unit is only exposed in a gully at the south end of the property and is poorly exposed. This unit consists of poorly bedded mudstone with sandstone interbeds on a 1 meter scale with a clay component of up to 15-30% representing an altered volcanic tuff component. This section represents a stratigraphic sequence of approximately 40 meters true thickness.

Unit 2-Laminated Mudstone

This unit is exposed on the west-central and southeast portions of the property. It provides a good distinctive marker horizon in the general sequence. This unit is thin (only 10-20 meters true thickness) and appears discontinuous but its finely bedded more resistant nature provides a good marker. Well laminated (0.5-1.0 cm. beds) fine grained mudstones provide good bedding information. The unit varies from tan to light green to black in color on a 20-30 cm. scale. The color change is largely dependant on the carbon content and plant fossils are also common. This sequence represents a lower energy event in a lacustrine environment.

Unit 3-Tuffaceous Mudstone (Bentonite Beds)

This unit covers a majority of the property due to the dip slope nature of the stratigraphy. This is particularly fortuitous in that this unit is the area of main interest as it contains a majority of the bentonite material (30-60% of the mass) on the property. This unit is a poorly bedded tuffaceous mudstone which weathers easily into a slippery light tan-white clay. Exposure is poor due this recessive property of the unit.





The protolith of the tuffaceous component (likely andesite vs. rhyolite) represents a higher energy environment in the lakebed preceding the erruption of the overlying andesitic flows. A distinctive feature of this unit is a couple of large recent landslides on the property (see discussion on the "Main Landslide"). These failures are likely a combination of the swelling and lubrication properties of the sodium bentonite upon combination with groundwater and loading of overlying andesite flows. This unit has an indefinite true thickness of 50-80 meters.

Unit 4- Andesite Flows & Diabase Sills

This is a distinctive unit with a 20-30 meter true thickness. Bedding is indistinct with flows generally forming masive resistant ridges. The andesitic matrix is fine grained with 10-25% plagioclase and pyroxene phenocrysts 1-3mm in diameter. The flows range from massive to amygdaloidal and vesicular. Amygdules are commonly filled with calcite, chalcedony and zeolites (0.5-3.0 cm in diameter). On the northern end of the property on the cliffs above Kamloops lake are some medium grained biotite bearing diabase sills to 20 meters in width which maybe the subvolcanic feeders for the overlying flows.

Main Lanslide (Fig. 5)

Prospecting, geological mapping and sampling was concentrated on this recent landslide area. The landslide has exposed a large area of bentonite (in excess of 18 hectares) that is ammenable to extraction and appears visually to be homogenous material. The slide area has exposed a large area of nondescript white/light tan clay material with relatively little contamination by soils or other rock types. This is particularly true for the toe of the slide which has very little topography to deal with and a general absence of vegetation (possibly in part due to high ph). Visually and with simple water tests (for colloidal content) the area the homogeneity of this unit appears extremely uniform. To test this a variety of samples were collected using an auger to depths of approximately 0.5 meter. These beds dip 10-25 degrees N-NE very uniformly and provide ideal dip slope continuity of the bentonite beds. No sample descriptions are provided as the samples are of a uniform earthy clay material with the object for seeing how uniform the media is. See the next section for a discussion of results.

8. Analytical Work

Several forms of tests were taken on the samples to gain an idea of the grade and uniformity of the material. A sample "X" (see fig.5 for location) was sent for XRD analysis (see Appendix 1) on a relatively low grade C.E.C. sample to determine the actual composition. This analysis indicates the sample contains 40% clay by weight of which 37% (or 92.5% of the clay) is sodium bentonite (smectite-montmorillonite). This sample compares to a C.E.C. test (# B1) which had a C.E.C. value of 41.2.

This compares to a total of 11 C.E.C. tests in this area from Pacific Soil Analysis Inc. which range from 24.8-42.3 C.E.C. indicating a moderately uniform bentonite content. These also compare favorably to samples 1193-2NR, 3 which are on the southern face of the hill . These samples have C.E.C. values of 41.1 and 53.1 respectively, with a dominance of Na exchangables. Samples 194-1,2,3 were taken on the south side of the hill 1.0 km SW of the slide area (see fig.4) and indicate a somewhat lower grade material with C.E.C. of 33.2-39.6 with much lower Na exchangeables. While 194-5 in the slide area returned a higher C.E.C. of 57.1. Two samples 1193-2NR, 3 were also sent to Norwest labs to compare C.E.C. results for deviation and results were found comparable $\pm/-6$ C.E.C..

Two (E.C.-10,11) samples were sent to Eco-Tech labs for wholerock and I.C.P. analysis as well (fig.5 locations). They reflect no deletrious trace elements are present in the material and have a wholerock signature that indicates an andesitic tuff was the protolith (low Si02 and higher MgO, Na2O and K2O). The Ph was also taken and indicates a very alkaline level of 10.86-11.79.

10. Conclusions and Recommendations

An extensive Eocene basin exists on the property with a Tuffaceous Mudstone (Na Bentonite) unit 3 outcropping over a large area due to its dip slope nature. This unit appears to range in true thickness from 50-80 meters. Work concentrated in the "main slide" exposes a large area (18+ hectares) of material that could provide easily up to 10+ million tonnes of Na bentonite (30-50% by weight). Several future activities are required and include: testing vertical continuity in the slide area and additional mapping and sampling on the remainder of the property for other high grade bentonite zones and the possibility of economic zeolites. In addition further material testing and a market study are required to find local and specific applications for this material.

11. References

1/ Ewing T.- pp.119-123, 1978 Fieldwork, B.C. Dept. of Mines.

2/ Hora D.- 1996 visit and personal communications.

- 3/ Monger J.- 1989 Geological mapping of the Kamloops area (92I), B.C.G.S. Open File
- 4/ Read P.- 1995 Geological Fielwork, B.C.G.S. report, Tertiary Geology and Industrial Minerals, South Central B.C.

٠

Appendix 1

Analytical Sheets

•

.



Phone:

Fax:

(604) 530-4344

(604)534-9996

203-20771 Langley Bypass Langley, B.C. V3A 5E8

(Lang.) (Other)	:	16560
# e Rec'd. e Comp.	::	12/27/95 01/02/96

Client

Received From

Name Address	: CHUCK MARLOW Name : : #2e, 7155 E. Trans Can Hwy Address : Kamloops, BC V2C 4T1	
Phone	: 573-2845 Phone :	
Fax	: Fax :	
Attn.	: Attn. :	
Project	•	

RESULTS OF ANALYSIS

Lab #	Sample ID	Cation Exchange Capacity (me/100g)
16560-1 * see fig 5 16560-2 + see fig 5	Zeolite/Bentonites 1193-4 N/R 2NR	34.4
16560-2 + see find 5	Zeolite/Bentonites 1193-43	54.3
16560-3	Zeolite/Bentonites 1193-5	37.2
16560-4	Zeolite/Bentonites 1193-8 N/R	37.9
16560-5	Zeolite/Bentonites 1193-9	52.9

Rhunar Approved:

.

Randy Neumann, B.Sc. Laboratory Manager

Accredited By: CANADIAN ASSOCIATION OF ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL) For specific tests registered with the Association



#5 - 11720 Voyageur Way, Richmond, B.C. V6X 3G9 Phone: (604)273-8226

Sig 5

Sigg

Kamloops	Indust	rial	Niperal	5.										
chux	K Marl	ow / Pai	1 Wat	<u>t.</u>										
SAMPLE C.E.C. CALCIUM MAGNESIUM SODIUM POTASSI														
14-1-250 see fin 12	<u>33.a</u>	8.25	3,50	0.60	3.50									
-2 see lini 4	33.7	11.5	5.00	.30	2.50									
-3 ser 245	39.6	14.3	5.75	.75	7.25									
-4 <u>see <u>Gis</u> 5'</u>	57.1	24.5	6.00	1.23	12.5									
-5A ``	76.8	26.5	5.50	1.33	32.5									
-6	49.8	22.8	10.0	.53	5,50									
	44.5	14.3	2.75	1.13	16.5									
-8	49.8	41.8	12.3	.25	1.75									
-9 Madbac	65.2	16.8	14.8	17.5	3.50									
- 10A Princeton	109.8	15.8	1.35	35.0	42.5									
-11A	6.79	9.50	.68	.78	,83									
34-1-250	13.1	11.8	4.00	4,25	2.00									
-2	18.2	17.0	5.25	2.48	,90									
	124.6	8.00	7.00	4.25	1.18									
-4 Flake	41.8	16.3	9.00	37.5	3.25									
					• •									
·	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		· · ·									
					1 : 									

••

#5 - 11720 Voyageur Way, Richmond, B.C. V6X 3G9 Phone: (604)273-8226

PACIFIC SOIL ANALYSIS INC.-

SOIL AND PLANT ANALYSES

Sept 19 96 Kamloops Industrial Minerals

	EXCHANGEABLE													
SAMPLE	C.E.C.	CALCIUM	MAGNESIUM	SODIUM	POTASSIUN									
		(me / 100 gm	ns) 										
RI	35.4	12.0	4.75	35.0	1.83									
BI	41.2	17.3	10.3	13.3	1.38									
<u>a</u>	423	24.8	10.5	1.75	1.28									
3	34.6	24.0	6.75	7.50	1.35									
4	36.7	13,3	5,75		1.25									
_5	46.1	21.5	/3.3	. 68	1.40									
6	34.6	15.3	11.5	23.3	1.45									
7	37.8	18.0	12.3	2,50	1.35									
8	38.6	20.2	12.3	21.3	.98									
9	24.8	14.5	2.13	28.8	.95									
10	28.1	16.0	2.25	37.5	1.23									
				1										
				1	!									
al and the constraints of the last sector of the		}	· •		1									
				:										
				:	1									

#5 - 11720 Voyageur Way, Richmond, B.C. V6X 3G9 Phone: (604)273-8226

Kamloops Industrial Minerals BULK AND CLAY X-RAY DIFFRACTION ANALYSIS OF A POSSIBLE SODIUM BENTONITE SAMPLE FROM BRITISH COLUMBIA Work Order A-6019

September, 1996

AGAT Laboratories

3801 - 21 Street N.E. Calgary, Alberta T2E 6T5

BULK AND CLAY X-RAY DIFFRACTION ANALYSIS

A sodium bentonite sample from British Columbia was submitted to Agat Laboratories for mineral identification. analysis.

The sample was analyzed using X-ray diffraction (XRD) techniques for mineral identification. The less than $2\mu m$ (clay fraction) was separated from the bulk sample using an ultrasonic bath and centrifuge and placed in a glycol vapour bath for 24 hours to separate clay minerals. The bulk and clay samples were run using sodium metaphosphate as a deflocculating agent. Weight fraction were measured for both bulk and clay portions of the XRD.

The XRD results (Figure 1) indicate the dominance of roughly equal proportions of potassium feldapar (KAlSi₃O₈) and smectite (montmorillonite $[Na]_{0.7}[Al_{3.3}Mg_{0.7}]Si_8)_{20}[OH]_4 \circ nH_2O$) with lesser amounts of quartz (SiO₂) and plagioclase feldpar (NaAlSi₃O₈). Minor amounts of illite (K_yAl₄[Si_{8-y}]O₂₀[OH]₄) and kaolinite clay (Al₄Si₄O₁₀[OH]₈) were also detected.

The analysis suggest that the sample is predominately volcanic or clastic minerals (potassium feldspar, plagioclase and quartz) with lesser amounts of sodium bentonite (smectite - montmorillonite?). Minor amounts of clay minerals (illite and kaolinite) were also identified.

AGAT LABORATORIES LTD.

FILE :AG019XRD

COMPANY :KANLOOPS INDUSTRIAL MINERALS LOCATION :DEPOSIT FROM BRITISH COLUMBIA WELL NAME :

۰.

\$

TABLE 1

SUMMARY OF X-RAY DIFFRACTION ANALYSIS

	Total	>		lays	C	{ ~~~~~												TYPE	SAMPLE
	Clay	Simec	ML.	m	Chl	Kaol	Sider	Bar	Ha]	бур	Anhy	Dol	Cal	K-Feid	Plag	Qtz	WEIGHT X	OF ANALYSIS	TORMATION
	29	29	6	0	0	п	n	n	٥	п	0	0	a	34	18	19	: 83.34	BULK FRACTION	,
	100		-				0				0				0	_		CLAY FRACTION	•
,	40	37	0	2	Đ	1	0	0	D	0	0	0	0	29	15	16		BULK & CLAY	

Ċ

5

4052525022

ć

	BORATORIES LT			1004	1 E. Tra	ns Cara	CEOG ALEXISTING IVILA TICALA ALEXISTING IVIRONMENTAL TESTING A Hwy. FIR. 22 Autoors, BCCV2C 67 Phone (604) 573-5700 Fax (604) 573-5700 Fax (604) 573-4557
CHUCK MARL 2E-7155 EAST KAMLOOPS, B V2C 4T1	DW TRANS CANADA HWY		<u>IFICA</u>	<u>TE OF</u>	<u>- ANA</u>	NLYSI 1	SAK 95-1193 5-Jan-96 No. of samples: 13 Sample type: Sal/Rock Project #: None given
ET #.	Tag#	BaO 0.09	P206	<u>\$IO2</u> 51.20	MnO 0.11	Fe203	MgO Al203 CaO TIO2 Na2O K20 LOL
10	95-10-11 95-11-11 95-12-11	0.09 0.07 0.06	0.48 0.48 0.24	53.88 77.97	0.09	6.13 5.93 0.32	4.84 13.39 5.93 0.84 2.98 3.21 10.61 -10 84 3.43 14.54 3.76 0.67 1.20 4.43 11.33 -10 84 0.45 17.12 1.97 0.08 0.52 1.62 9.62 11 79
QC DATA: Repeat:	Ficke	•					
10		0.11	0.53	51.56	0,11	6.07	4.88 13.33 5.85 0.81 2.96 3.31 10.51
STANDARDS: Mrg-1 ~Sy-2 Nete: Values e	xpressed in percent	0.01 0.03	0.08 0.48	39.24 59.59	0.17 0.31	17.38 6.03	13.34 8.21 14.52 3.79 0.75 0.16 2.40 2.80 12.10 7.92 0.19 4.18 4.63 1.84
XI rarlow d. ,93						Pag	ECO-TECH LABORATORIES LTD. Prank J. Pezzotti, A.So.T. B.C. Certified Assayer

2-Jan-96

ECO-TECH LABORATORIES LTD. 10041 East Trans Canada Highway KAMLOOPS, B.C. V2C 6T4

Phone: 604-573-5700 Fax 604-573-4557

CHUCK MARLOW AK95-1193 2E-7155 East Trans Canada Hwy. KAMLOOPS, B.C. V2C 4T1

No. of samples; 13 Sample Type: Soil/Rock PROJECT #: None given

10 20 <20 619 0.03 <10 93 <10 9 66

<5 <20 68 0.08 <10 77 <10 4 70

1 0.04 22 720 20

Values in ppm unless otherwise reported

< 2 2 12

10 158

<5 185

5 3.74 <1 20 72

65 150 <5 1.67 <1 17 63

Et #.	Tag #	Ag	AI %	A	Ba	Bi	Ca %	Cd	Co	Cr		Fe %	La	Mg %	Мп	Мо	Na %	NI	Ρ	РЬ	Sb	Sn	Sr	п%,	u	v	w	Y	Zn
10	95-10-11 - 95 EC-1	><2	2.11	<5	180	<5	3.72	<1	20	73		4 21	20	2.78	906	4	1.05	53	1970	8	25	<20	610	0.03	<10	94	<10	9	66
	95-11-11 5 i∮S €C-I	< 2	1 95	<5	130	<5	2.09	<1	16	57	49	4 09	30	1 77	761	6	0.04	47	1900	16	15	<20	328	0.03	<10	86	<10	10	72
12	95-12-11	< 2	2.14	10	710	<5	1.08	<1	<1	19	16	0.25	<10	0.24	48	<1	0.03	3	160	12	10	<20	831	0.01	<10	5	<10	t	5
QC/D Repe	ATA:																												

82 381 <10 0.97 668

35 4.19 20 2.79 905 4 1.05 52 1980

٠

df/1187 XLS/95marlow

!

10 95-10-11

Standard: GE095

11 ECO-TECH LABORATORIES LTD. Frank J. Pezzótti, A.Sc.T. B.C. Certified Assayer

.

Page 1

Appendix 2

Statement of Costs

•

STATEMENT OF COSTS

1/ L.C. Marlow- Property Prospecting- 8 days @ \$200/day (May 10,17,24,31, June 1,7,8,21,1996)		\$1,600.00
2/ G.Evans- Geological Mapping-1 day @ \$300/da (June 8,1996)	ay	\$ 300.00
3/ Truck (8 days @ \$50/day include. fuel)		\$ 400.00
4/ Analyses - 1-XRD @ \$265.00/sample 19-C.E.C. @ \$25.00/sample 2- ICP, Ph, Wholerock @ \$32.00/sample	\$265.00 \$475.00 \$64.00	Total- \$ 804.00
5/ Misc. materials, equipment, shipping, copying etc.		\$ 123.00
6/ Report 2 days G.Evans @ \$300/day		\$ 600.00

TOTAL = \$3827.00

٠



Appendix 3

Statement of Qualifications

.

STATEMENT OF QUALIFICATIONS

- I, Graeme Evans, do certify that:
- 1) I am a geologist and have practiced my profession for the last thirteen years
- 2) I graduated from the University of British Columbia, Vancouver, British Columbia with a Bachelor of Science degree in Geology (1983).
- 3) I am a member in good standing with the APEGBC as a professional geoscientist.
- 4) I was actively involved and supervised the Basin program and co-authored the report herein.
- 5) All data contained in this report and conclusions drawn from it are true and accurate to the best of my knowledge.
- 6) I hold no direct personal interest, in the Basin property which is the subject of this report.



Summer Former

Graeme Evans Geologist November, 1996

STATEMENT OF QUALIFICATIONS

- I, L.C. Marlow, do certify that:
- 1) I am a prospector and have practiced my profession for the last <u>25</u> years
- I graduated from the BCDM prospecting school provided at Measachie Lake in <u>1986</u>.
- 3) I graduated from the Advanced prospecting course sponsored by the BCDM in Kamloops in _______.
- 4) I was actively involved and supervised the Basin program and co-authored the report herein.
- 5) All data contained in this report and conclusions drawn from it are true and a ccurate to the best of my knowledge.
- 6) I own the Basin property which is the subject of this report .

L.C. marlow.

L.C. Marlow Prospector November, 1996