Assessment Report

on

TALC PROJECT - PILOT SCALE TESTS AND DIAMOND DRILL PROGRAMME

TALC GROUP
(Gold Ridge 1, 2, & 3 and, Latch 1 & 2)

Located in the
Kamloops Mining Division and New Westminster Mining Division
NTS 92I/4E

Report prepared on behalf of
HIGHLAND TALC MINERALS LTD.
Hope, B.C.

by

D.G. Cardinal, P.Geo., F.G.A.C.
Hope, B.C.

November 30, 1994

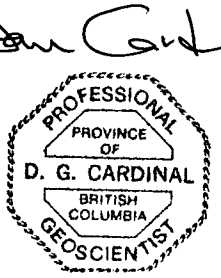


TABLE OF CONTENTS

A. PREAMBLE

Through 1993 and 1994, Highland Talc Minerals Ltd. (HTM) continued with it's multi-phase talc development programme.

As part of the development programme, HTM received full technical support from Finnminerals Oy of Finland. Finnminerals is a world leading talc producer and is also consider to be a leader in talc research and technical know-how in developing high quality products for various industrial end users.

Duing July - September, 1993, HTM obtained a 100kg composite talc sample from it's South Talc Deposit and had it shipped to Finnminerals laboratory facilities in Finland for bench scale tests. Results from this work were positive and several limited amounts fo quality talc products were produced including filler, pitch control, and coating grade talc.

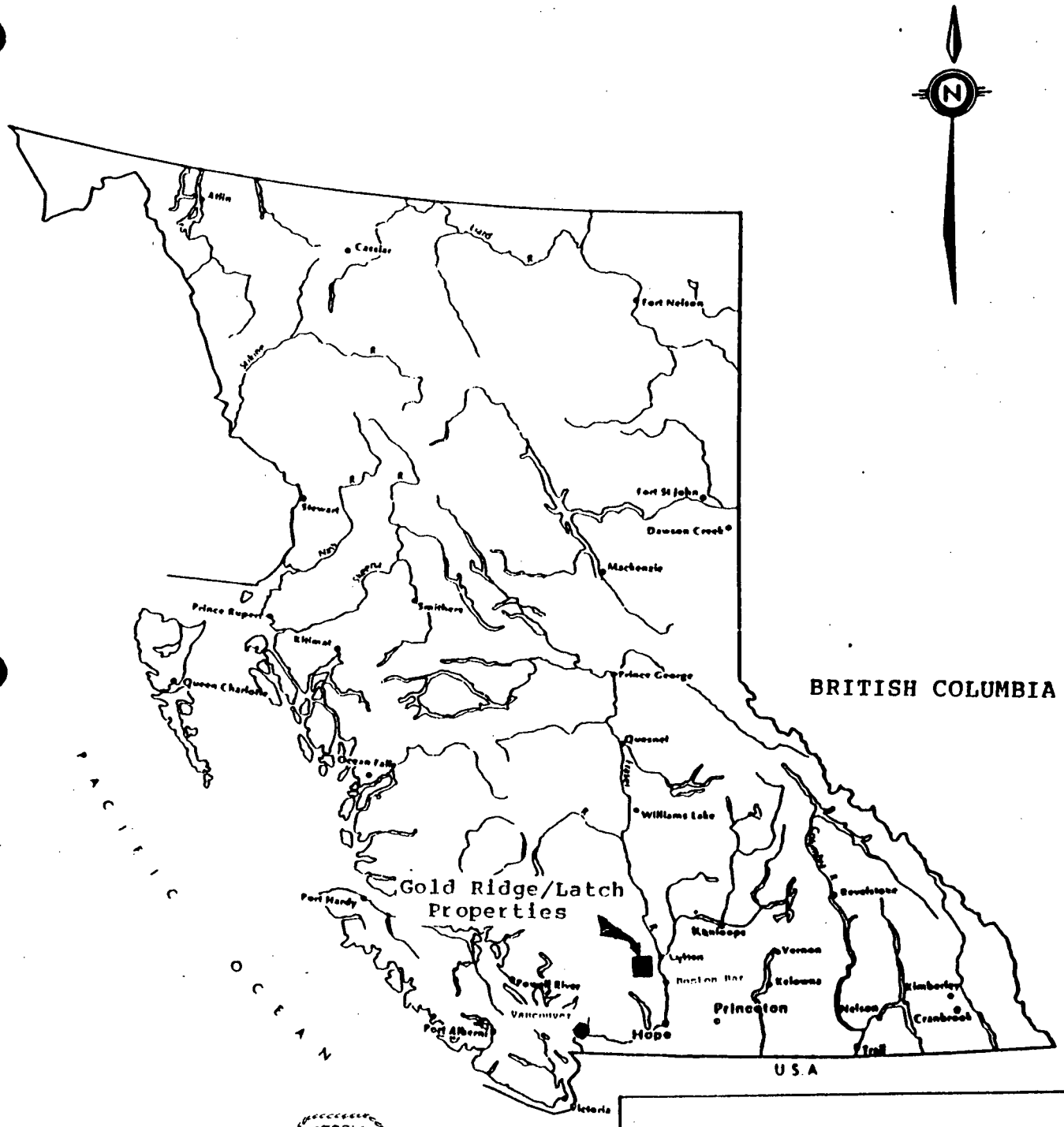
In November, 1993, a 120 tonne raw talc bulk sample was collected from the North Talc Deposit and shipped to Finland for detail Pilot Scale tests. The raw material was beneficated and processed into various quality paper-grade talc products. A successful talc coating paper trial run was also conducted from HTM's processed talcs using Finnish pilot scale papermaking facilities.

This was followed by paper trial runs in BC. In August, 1994, HTM requested Finnminerals to makedown a coating grade talc slurry product. The product was then shipped to the west coast. Starting the latter of August through to October, 1994, a major papermaking company conducted a series of trial runs. With some technical papermaking assistance from Finnminerals the company successfully produced light weight coated papers with good gloss and brightness, using HTM's coating talc slurry.

During July - September, 1994, HTM also conducted a 10-Hole follow-up diamond drill programme on it's South Talc Deposit. Previous (1990-91) drilling on the deposit had preliminary defined in the order of 12-15 million drill indicated tonnes of raw talc, grading on the average of 55-65% talc and 30-40% magnesite.

A recently completed (November, 1994) prefeasibility study commissioned by the Ministry of Employment and Investment on a "generic" typ of value added talc project near the west coast (similar to HTM's talc project), has shown that a value added paper-grade talc producer meeting the pulp and paper industry specifications, could be economically viable.

The results presented in this report are from the 1993-94 talc development programme and are herein submitted for assessment work credits.



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. G. CARDINAL
GEOSCIENTIST

TALC PROPERTIES
(Gold Ridge/Latch)

Location Map

HIGHLAND TALC MINERALS LTD.
Hope, B.C.

Fig. 1.

B. INTRODUCTION

Highland Talc Minerals Ltd. is an industrial mineral source company based in Hope, BC. HTM's objective is to establish a value added talc manufacturing facility, and to bring into production it's extensive raw talc deposits located northeast of Boston Bar.

Since 1990, HTM has systematically evaluated these deposits from geological surveys, drilling, sampling, pilot scale testing, paper trial runs and through to marketing studies.

Talc because of it's natural characteristics such as, brightness, softness, aspect ratio, and other physical properties makes it acceptable to various industries including: paints, plasics and pulp & paper. The west coast pulp and paper industry has forecasted a growing demand for value added coating pigments and fillers such as talc because of the increasing cost and growing shortage of wood fibre.

HTM's raw talc deposits are strategically located near the Pacfic Northwest region with excellent access and good infrastructure. It has also established a strategic alliance with a leading Finnish talc producer. Allowing HTM access to technical know-how and technical support to process and produce high quality value added talc products.

C. PROPERTY INFORMATION

C.1 Mineral Claims Data

The mineral claims consist of one contiguous group which make up the Gold Ridge 1, 2 & 3; and the Latch 1 & 2. They lie within the NTS 92I/4E mapsheet which is divided into 2 mining divisions. The Gold Ridge are in the Kamloops MD, and the Latch in the New Westminser MD. HTM is the registered owner of the claims.

Pertinent claim data is as follows:

Claim Name	Tenure No.	No. of Units	Recording Date	Expiry Date
Gold Ridge 1	217695	20	Nov. 17/86	Nov. 17/97
*Gold Ridge 2	217696	20	Nov. 17/86	Nov. 17/97

Gold Ridge 3	217697	20	Nov. 17/86	Nov. 17/97
Latch 1	235756	20	Sept. 29/88	Sept. 29/97
Latch 2	235757	20	Sept. 30/88	Sept. 30/97

*Gold Ridge 2 subsequent to filing of the assessement work, has been divided into Talc Ridge 1, 2, 3 & 4. Talc Ridge 1 is now being taken to mining lease.

The above-noted mineral claims are herein referred to as the 'Property'.

C.2 Location . Access . Infrastructure

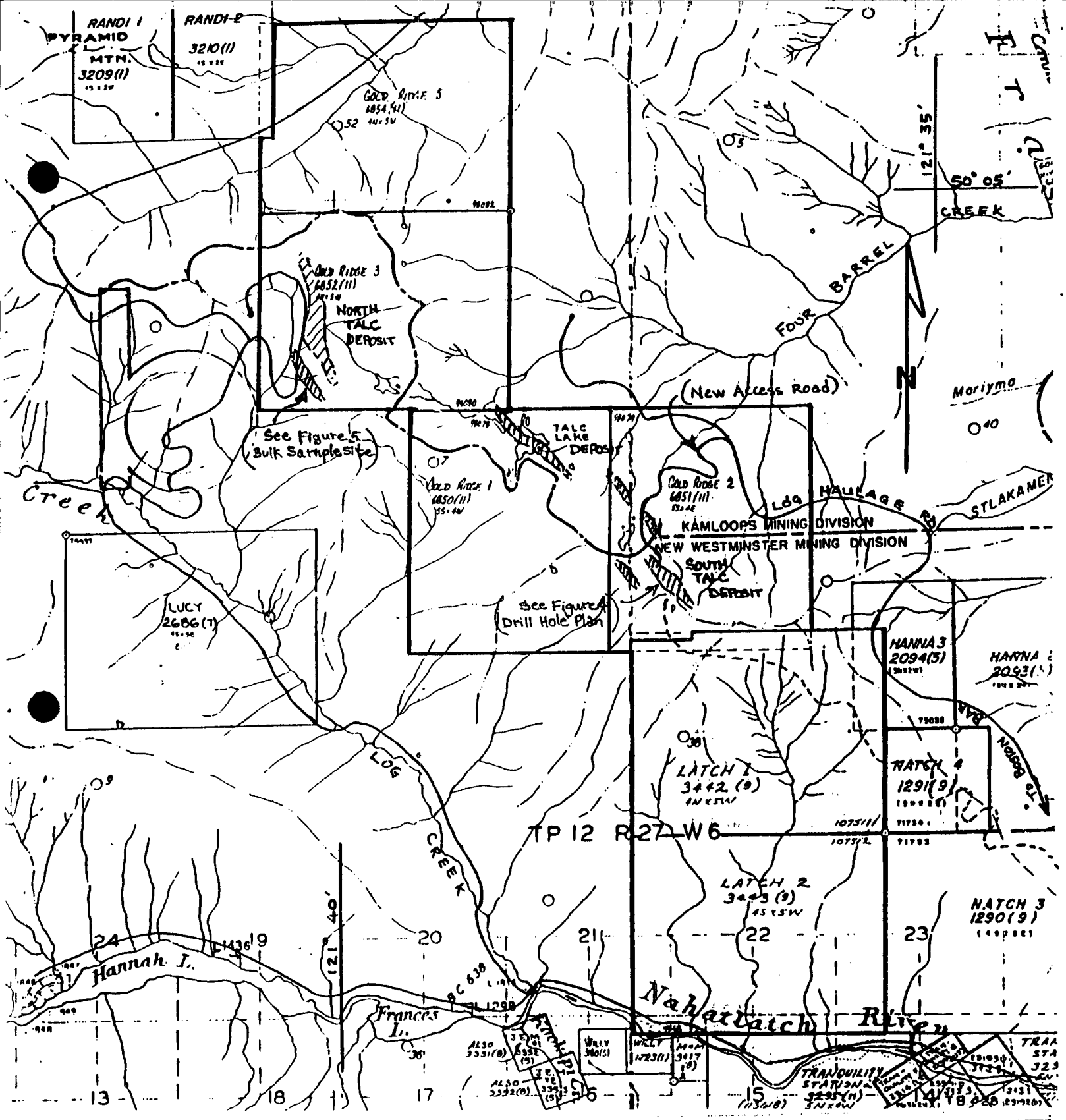
The Property is strategically situated within the Pacific Northwest region, some 240 road kilometres from the port City of Vancouver. It is also located about 90km northwest of the town of Hope and some 20km northwest of the community of Boston Bar.

Access to the main area of work (South Deposit) can easily be reached from Boston Bar by public and forestry - logging access roads. Log haulage roads at higher elevations are normally accessible between the months of April to November but are closed during the winter months.

The Property is within a few short kilometres of well established infrastructure. A major transportation corridor runs through Boston Bar and Hope linking Vancouver and other west coast cities. The Trans Canada Highway and both the Canadian Pacfic and the Canadian National Railways form a transportation network through the area. As well, low cost hydro-electric power can easily be sourced. And both experienced labour and heavy machinery are readily available.

D. BRIEF GEOLOGY

Regionally, the geological setting is comprised of a structural belt of serpentinized ultramafic rock that can be traced trending northwesterly for some 32km. The semi-continous belt of serpentine is fault bounded by a sequence of predominately undifferentiated greenstone, phyllite and schist. This metamorphic sequence is suggested to be Permian to Jurassic in age and equivalent to the Bridge River Complex (JWS Monger, GSC, 1980-82).



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. G. CARDINAL
GEOSCIENTIST

0 1000 2000

1:50,000

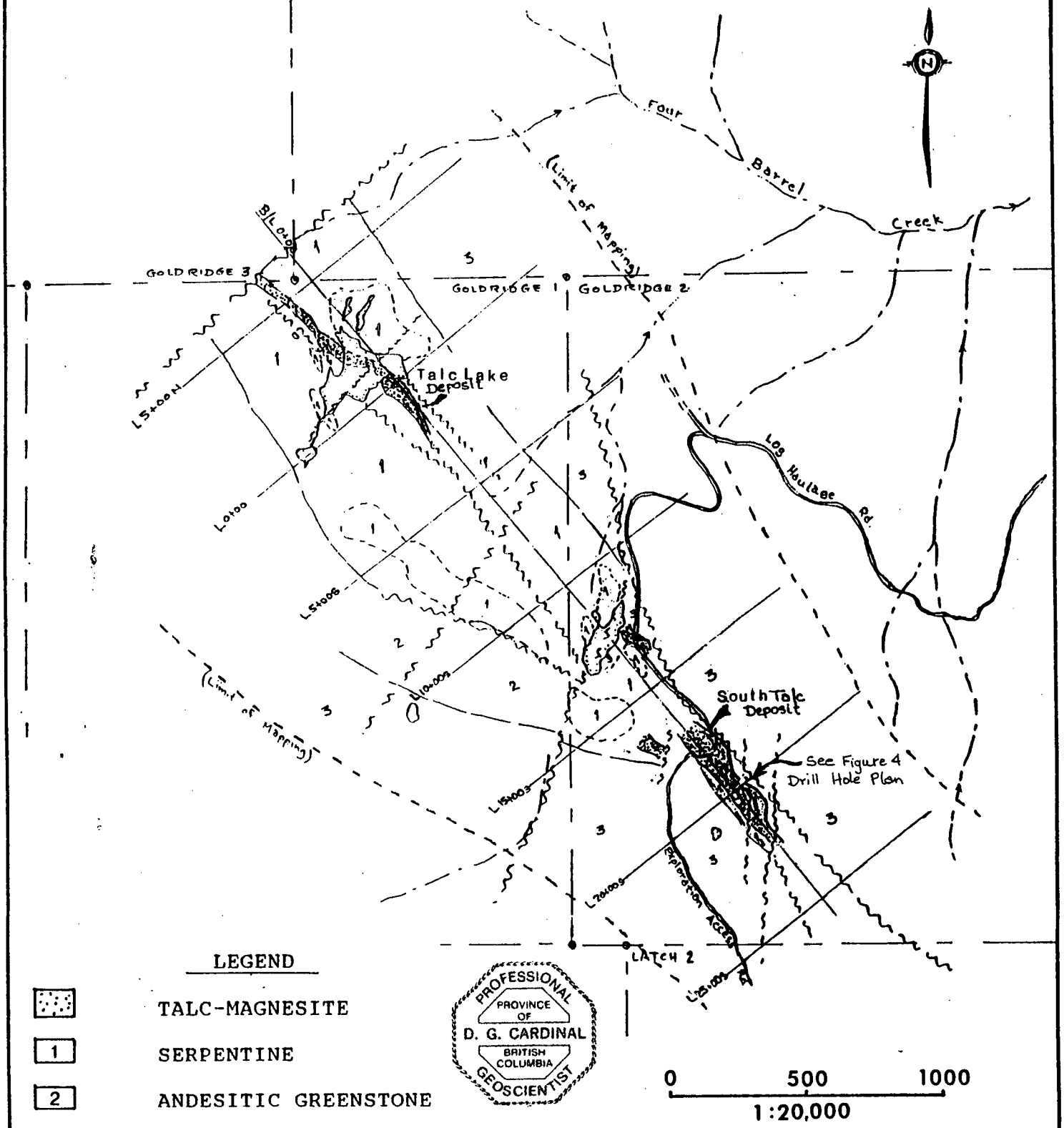
HIGHLAND TALC MINERALS LTD.

CLAIM MAP

921-4E

BY: J.W. MURTON & ASSOCIATES

DATE: AUG. 28, 1992 | MAP #2



HIGHLAND TALC MINERALS LTD.

PROPERTY GEOLOGY

BY: J.W. MURTON & ASSOCIATES

DATE: AUG. 28, 1992 | MAP #3

The metamorphic belt was subsequently intruded by Cretaceous age granodiorite of the coast range plutonic complex. The serpentinized ultramafic belt appears to be an accreted terrane and resembles a fossilized oceanic floor.

Locally, the Property covers a section of the above-noted belt. It covers some 5-6km of the serpentine belt which strikes northwest-southeast, ranging in width from 50m to just over 1000m. The serpentine is fault bounded and in fault-contact with predominately phyllite and schist. The entire structural sequence dips steeply (+70 $^{\circ}$) to the east-northeast.

At least 3 significant deposits of talc(and magnesited) have been defined along the serpentine structure, the South Deposit, Talc Lake Deposit, and the North Deposit. Associated with these deposits are at least 4 to 5 smaller satellite deposits. Based on the drilling and geological evaluations to date, combined, the deposits have the potential of hosting in excess of 60 million tonnes of raw talc-magnesite inplace, grading between 50-60% and 30-40% respectively.

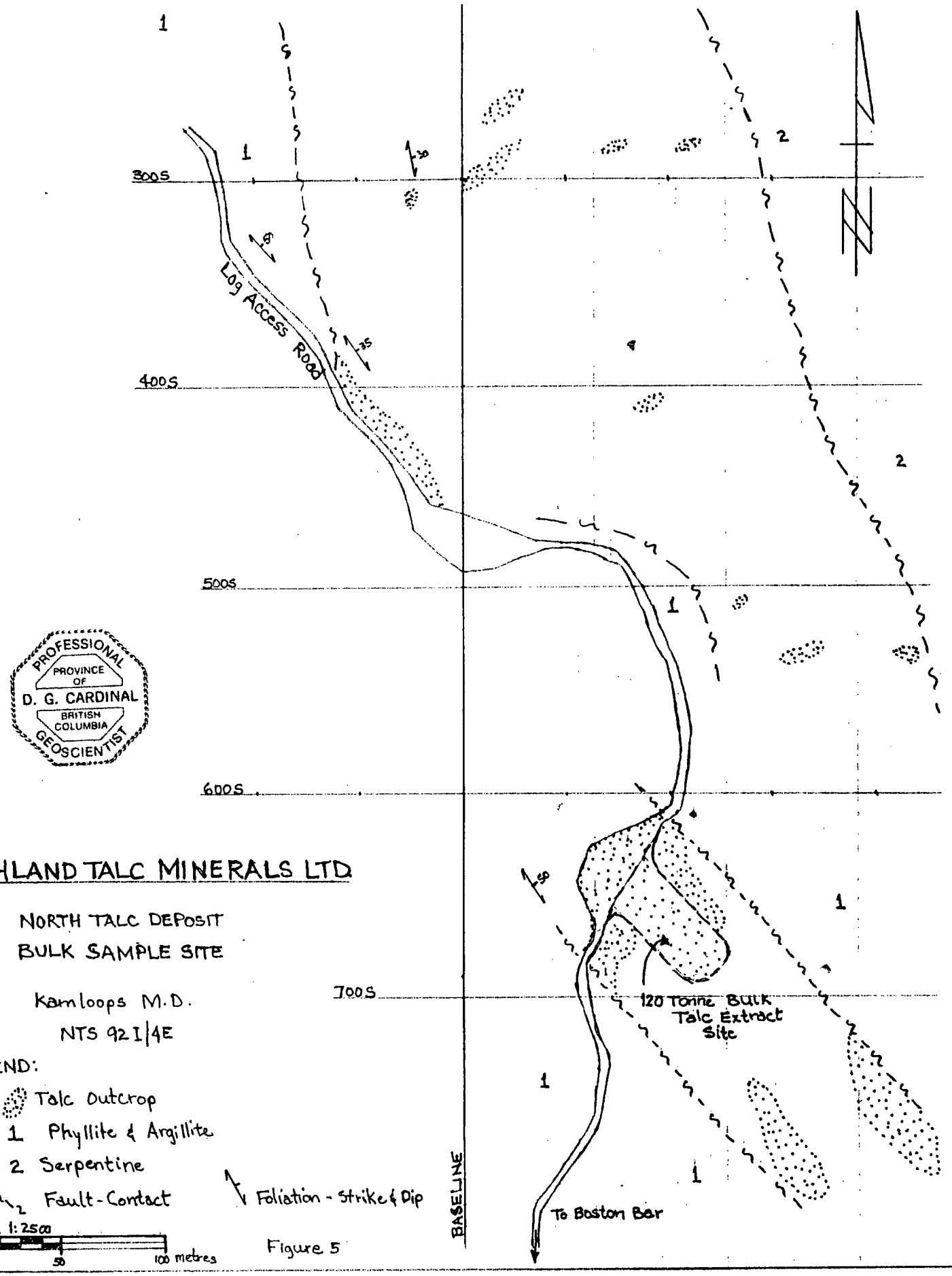
The deposits tend to occur at the fault-contact between the serpentine and phyllite/schist. The larger deposits are lensoid in shape and vary in dimensions ranging from 600m-1000m in length and 50m-150m in width. The South Deposit has been drill tested to a depth of 200m with talc-magnesite encountered from surface to bottom.

E. PILOT SCALE TESTS

E.1 Bulk Sampling

A site was selected on the North Deposit to obtain a raw talc bulk sample for the pilot scale tests.

An area was selected immediately adjacent to a former log haulage road with easy access and, where part of the talc deposit was partially exposed and with limited overburden. A dozer-ripper was utilized to strip away the shallow overburden and oxidized material. Much of the raw talc was quite soft and amendable to ripping and therefore did not require any blasting.



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. G. CARDINAL
GEOSCIENTIST

HIGHLAND TALC MINERALS LTD

NORTH TALC DEPOSIT
BULK SAMPLE SITE

Kamloops M.D.
NTS 92I/4E

LEGEND:

- Talc Outcrop
- 1 Phyllite & Argillite
- 2 Serpentine
- Fault-Contact
- Foliation - Strike & Dip

Scale 1:2500
0 50 100 metres

Figure 5

A 3-cubic metre rubber tire loader was then used to load a 12 tonne truck. The material was hauled several kilometres down the logging road and stockpiled at a site where 2 Super B-train trucks carrying 4 - 25 tonne Hapag-Lloyd containers would have enough room for loading and turn-around.

Much of the stripping, loading and hauling was conducted during the latter part of November, 1993. The area stripped has dimensions of about 50m by 25m, and about 3m-4m of overburdern and oxidized material was removed to reach fresh talc material. Approximately 120 tonnes of raw talc was extracted and stockpiled.
The containers were then transported to Vancouver and loaded onto a steamship line and shipped to Finland for the pilot scale testing.

E.2 Pilot Scale Tests

The containers arrived in Finland in early January, 1994. The talc was forwarded to Finnminerals's pilot scale facilities.

Added to this section of the assessment report is Finnminerals's report titled "PILOT SCALE TRIALS OF HIGHLAND'S TALC - Made by Finnminerals Oy, Finland, April, 1994", describing in detail the pilot scale procedures.

Briefly, the report includes the beneficiation process from grinding procedures, flotation through to micronizing results. It also includes chemical and physical properties of the talc, particle size distribution curves and paper-grade talc rheology tests. The final products produced included: talc filler and extender with average particle size distribution of 10 microns and brightness of 80-83% ISO; and pitch control with average particle size distribution of 2 microns and a brightness of 83-85% ISO. A coating grade slurry talc pigment was also produced meeting rheology specifications of light weight coated (LWC) papers.

The above tests were then followed up by LWC paper trial runs where several different weights of coated grade papers were produced using the talc slurry. Results of the trial runs are also included in above-noted Finnminerals Oy's technical report.

F. DIAMOND DRILL PROGRAMME

During August 1st to September 15th , 1994, a diamond drill programme was conducted on the South Deposit which is located on the Gold Ridge 2 mineral claim. A total of 10 holes were drilled for a total metres of 1,202m.

Previous (1991-92) drilling on the deposit consisted of 8 core holes which outlined drill indicated reserves of 12-15 million tonnes of crude talc with associated magnesite. The purpose of this seasons drilling was to define and prove up the reserves.

The type of drill machine used to conduct the drilling was a Long Year Super 38. The drill core was NQ size. A John Deer 550 dozer was available on site to move the machine and prepare drill sites.

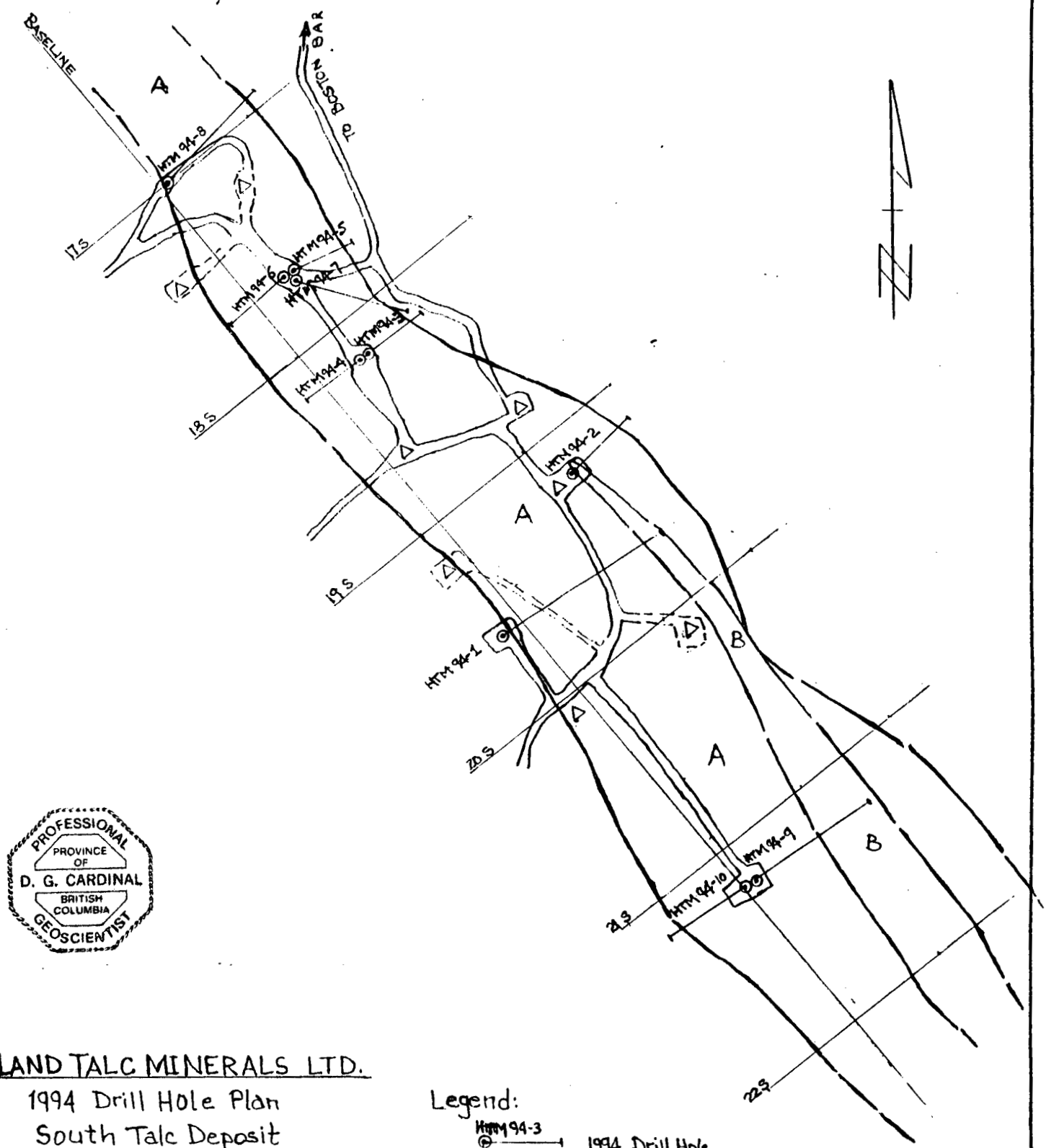
Seven (HTM 94-1, 2, 3, 4, 5, 6, & 8) of the 10 drill holes are included in this report and are attached to Appendix I. Drill holes HTM 94-7, 9, & 10 are yet to be completed for sampling and log descriptions.

However, a very brief outline of the 3 drill holes are as follows: HTM 94-7 was drilled to a depth of 201.83m; HTM 94-9 to 155.18m and HTM 94-10 to 189.63m. Both HTM 94-7 and 10 encountered talc and lesser magnesite from surface to bottom of hole. HTM 94-9 encountered phyllite and schist with only minor talc and magnesite. It should also be noted that HTM 94-6 was abandoned at the depth of 40.85m due to loss of water circulation and binding of drill rods. All of the other holes met their objectives.

G. RESULTS AND CONCLUSIÓN

Objective of the pilot scale testing was to determine whether HTM crude talc could be beneficiated to produce high quality paper-grade, and other industrial end use talc products.

The results from the testing were positive. The crude talc was beneficiated to produce 3 different grades of talc product that met the pulp & paper, paint and plastic industry



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. G. CARDINAL
GEOSCIENTIST

HIGHLAND TALC MINERALS LTD.

1994 Drill Hole Plan
South Talc Deposit

Kamloops M.D.
NTS 92I/4E

Scale 1:2500
0 50 100 metres

Legend:

- HTM 94-3 — 1994 Drill Hole
- Δ 1990-92 Drill Hole
- A Talc (Magnesite)
- B Phyllite-Schist
- Geological Contact

Figure 4.

specifications. From the crude material, filler, pitch control, and coating grade talcs were produced.

The LWC paper trial runs conducted also produced positive results. A light weight, good gloss, 4-colour printable paper was produced which meets magazine grade standards (eg. News Week, Time, etc.)

Using the Finnish technical know how, HTM is capable of producing coating talc slurry which can be used in LWC papers. And with Finnish technical backing, HTM is in a position to develope a value added talc manufacturing facility where quality talc products could be produced for the various end users.

The objective of the diamond drill programme was to prove out the drill indicated reserves previously defined on the South Talc Deposit. Although talc/magnesite analyses and reserve calculations have yet to be completed, preliminary results from the 10-drill programme are positive. Previous drilling indicated possible-probable reserves of 10-15 million tonnes of crude (50-60%) talc in-situ. It is expected once the 1994 drill data is compiled, that the reserves will significantly increase.

H. COST STATEMENT

Costs outlined below were incurred between November 20th, 1993 and September 20th, 1994.

Cost breakdown is as follows:

A. Pilot Scale Tests:		
Bulk Sampling (Includes stripping, loading & hauling to Vancouver)		$ 15,223.00
Shipment of Crude Talc (Ocean freight from Vancouver to Finland)		14,257.00
Pilot Scale Tests by Finnminerals Oy (Beneficiation, micronizing & paper trial runs)		64, 157.00
Shipment of Talc Slurry (From Finland to Vancouver for west coast paper trials)		7,711.00
	Sub total	$ 101,348.00
B. Drilling Programme:		
Metres drilled, 1,202m @ $42/m		50,484.00
Mob. and Labour		2,936.00
Supervision, Geologist, 23 days @ $200/d		4,600.00
	Sub total	$ 58,020.00
	Total Costs Incurred	$ 159,368.00

Respectfully submitted,

D.G. Cardinal, P.Geo.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. G. CARDINAL
GEOSCIENTIST

H. REFERENCES

Cardinal, D.G., (Dec.11/92), Geological Assessment Report On The Gold Ridge Claim Group (Gold Ridge 1, 2, 3, & 5) - Talc Mineral Claims.

Cardinal, D.G., (Nov. 30/92), Geological Assessment Report On The Gold Ridge 2 and Latch 1 and 2 - Talc Mineral Claims.

Chamberlain, J.A., (1973), Geological Report, "H" Claims, Nahatlatch Area, BC. Department of Mines and Petroleum Resources Assessment Report No. 4985.

Duffel, S. and McTaggart, K.C., (1952), Ashcroft Map Area, Geological Survey of Canada, Memoir 262.

Maclean, M., (1988), Talc and Prophyllite in British Columbia, BC., Ministry of Energy, Mines and Petroleum Resources, Mineral Resources Division, Geological Survey Branch.

Ministry of Employment & Investment, (Oct., 1994), Talc Value-Added Opportunity, Project 8649-15, Prefeasibility Study, Kilborn Engineering Pacific Ltd.

Monger, J.W.H., (1980-82), Bedrock Geology of Ashcroft (92I) Map Area, Scale 1:125,000, Geological Survey of Canada.

Murton, J.W.,P.Eng., J.W. Murton & Associates, (Aug. 28/92), Summary Report on the Talc Properties of Highland Talc Minerals Ltd., Kamloops Mining Division and New Westminster Mining Division, NTS 92I/4E.

Temanex Consulting Inc., George Ionides and Maria Harris, Temanex Report, (Feb. 1994), Update Of A Market Study For Talc, TN94-198.

J. PROFESSINAL CERFICATE

I, Daniel G. Cardinal of the municipality of Hope, British Columbia, do hereby certify that:

I'am a Professional Geoscientist residing in Hope, BC. Address: 65661 Birch Trees Drive, P.O. Box 594, Hope, BC., VOX 1L0.

I'am a graduate fo the University of Alberta (1978) and hold a BSc. degree in Geology.

I'am registered as a Fellow of the Geological Association of Canada (F.G.A.C.); a member in good standing with the Association of Professional Engineers, Geologists and Geophysicists of Alberta (P.Geo.) and, a member in good standing with the Professional Engineers and Geoscientists of British Columbia (P.Geo.).

I have been practicing my profession continously for the past 16 years.

I have supervised the 1993-94 talc development programme and field related projects documented in this report.

and, that I'am the author of this report.

D.G. Cardinal, P.Geo., F.G.A.C.

APPENDIX I
GEOLOGICAL DRILL LOGS
(HTM 94 - 1, 2, 3, 4, 5, 6, & 8)

GEOLOGICAL
CORELOG DATA SHEET

PROJECT Highland Talc | CORE SIZE NQ | RIG TYPE Long Year 38
DATE Sept. 4 '99 | HOLE LOCATION | COMENTS
HOLE NO. HTM 99-1 | ORIENTATION (DIP) -55 (AZ.) 52°
LOGGED BY DGC | % RECOVERY

TALC MAGNESITE

DEPTH Ft.	LITHO LOG	VISUAL ESTIMATES TALC	VISUAL ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
20		50	45		20	0-20 casing
						20-52 oxidized talc/magnesite weathered - broken
30					33	2' Missing Core
	M/C					
40		50	45			oxidized
50						
						52-78 Serpentine - massive green
60						
70						
					78	
80		55	~40			78- light grey-grn massive unoxidized talc/magnesite minor Fractures
		60	35			
90					90	90-92 - very soft intensely fractured talc gouge
		65	30			
100					100	massive Lt grey/grn talc
		60	35			
	M/C					102-108 missing core
110					110	
		65-70	20-30			114-132 badly fractured & broken talc gouge w/ sections of high grade talc
120	M/C				100	119-120 missing core
		65-70	20-30			
130					130	

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT Highland Talc
DATE Sept. 26 /94
HOLE NO. HTM 94-1
LOGGED BY DGC.

CORE SIZE NQ
HOLE LOCATION
ORIENTATION (UP) -55° (Az.) 52°
% RECOVERY

RIG TYPE Long Year 38
COMENTS

TALC MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Mineral(s))
120	Mic					130-131 missing core
		60	35			massive light grey/grn
140					NQ	
		60	35			
150					150	
						157-164 Fractured & broken
160					160	
						163-166 - Mody Fractured & Broken
						166-171 - massive light grey/grn talc
170					170	
		65-70				172-220 - high quality talc - pearly lustre light green - white.
						High quality - blue-grn talc - soapy feel very soft
180					180	
		65-70				183-185 - talc gouge
	Chlorite					chlorite lense - schistose
190					190	
		75-80				talc - white - light green talc foliation 45° to core axis
200					200	@ 199.5 narrow (4 in.) chlorite lense
		75-80				
210					210	
		75-80				@ 211 narrow (6-8 in.) chlorite lense
220					220	220-250 massive light grey-grn-wht. talc / magnesite
230					230	
240						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____
DATE _____ HOLE LOCATION _____ COMENTS _____
HOLE NO. HTM 94-1 ORIENTATION (DIP) (AZ.) _____
LOGGED BY _____ % RECOVERY _____

TALC MAGNESITE

DEPTH Ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Mineral(s))
240						
		65-70	20-25			245-260 - high grade talc lt grn - pearly lustre
250		65-70	20-25	250		
					260	260-263 - intensely fractured - talc/serpentine
260	Serpentine/talc fault zone					264-274 - major faulting w/ talc/serpentine fault gouging.
270						
						@275.5 fault contact between serpentine & schist/phyllite. Fault contact @ 45°-50° to core axis
280						275.5-307 Schist/phyllite - foliation & banding varies from 45°-60° to core axis
290						
300						
	EOH.					End of Hole @ 307' (93.60m)

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT HIGHLAND TALC — CORE SIZE NQ — RIG TYPE LONG YEAR 38
DATE Sept. 4/94 — HOLE LOCATION — COMENTS
HOLE NO. HTM 94-2 — ORIENTATION (DIP) -63° (AZ) 43°
LOGGED BY DGC — % RECOVERY

TALC MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
						0-26 CASING
						26-55 schist/phyllite foliation 50-60° to core axis
30						
40						
50						
						55-56.5 serpentine/chlorite (56.5-335 Talc)
		60	35			61-63 white talc fault gouge massive white-greenish talc throughout.
60						
		65-70	30-30			66-66.5 serpentine lense
70						
						74-75 pearly grn talc schist
		65-70	20-30			75-101 good white-greenish talc
80						
						84-93 Fracture & broken talc
90						
		65-70	20-30			
100						100-101 fractured
		65	30			
110						110-130 massive greenish talc throughout little fracturing - quite solid
120						
		65	30			
130						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HTM 94-2 ORIENTATION (Dip) _____ (Az) _____

LOGGED BY DGC % RECOVERY _____

▨ TALC ▨ MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
130		65-70	15-20			130-214 mostly massive white-greenish talc with minor magnesite. Foliation 40-45° to core axis.
140						Greenish-white talc w/ minor magnesite throughout
150		65-90	15-20			
160						162-164 broken - talc gouge
170						172-174 broken - Fractured
		65-90	15-20			
180						182-184 - broken & Fractured
190						Gry-grn-whitish massive talc w/ minor magnesite throughout. Foliation various 45-60° to core axis
		65-70	15-20			
200						
210						214-225 - badly Fractured & broken @ 215 Fault - talc gouge 218-222 - talc gouge, intensely Fractured
220						
		65-70	15-20			Massive gry-grn-wht talc & minor magnesite.
230						
240						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HM 91-2 ORIENTATION (DIP) (AZ) _____

LOGGED BY DGC % RECOVERY _____

TALC MAGNESITE

DEPTH ft	LITHO LOG	VISUAL GRADE ESTIMATES TALC	MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
240		65-75	15-20			240 - 280 Massive Lt grey-grn - wht talc w/ minor magnesite
250						
		65-75	15-20			
260						262 - 263 Fractured & broken
270						
		65-75	15-20			
280						280 - 335 Intensely fractured & faulted contains abundant Talc gouges through Lt grn - white rich talc
290						Talc gouge @ 287 - 288
						Talc gouge @ 290 - 294
300		65-75	15-20			
						306 - 324 Intensely broken & sheared
310						Rich in talc throughout
320		65-75	15-20			Talc gouge @ 320 - 324
						Talc gouge @ 326 - 328
330						
						Contact @ 335 - Highly Fractured schist
340						340 - 348 - bands of chlorite & schist phyllite foliation 40°-45° to core axis
	EOH					End of Hole @ 348' (106.10m)

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT HIGHLAND TALC
DATE Sept. 11 94
HOLE NO. HT 94-3
LOGGED BY D.G.C.

CORE SIZE N Q
HOLE LOCATION
ORIENTATION (DIP) -60° (AZ.) 48°
% RECOVERY

RIG TYPE Long Year 38
COMENTS T.D. 388

TALC MAGNESITE

DEPTH ft	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
						Casing to 23'
						0-23 No core
10	CASING					
20						
						23-26.5 missing core
	M/c					27-35 highly oxidized - oxidized talc/ mud.
30		60-	35			
	M/c					2' missing core
					31	35-40 partly oxidized, Lt grey w/ talc grey crystalline magnesite
40		55-60	30-35		42	40-61 Lt grey-green talc - ~~no oxidation~~
					50	
50		55-60	30-35			
60					60	61-82 massive, Lt grey-greenish talc & magnesite Foliation approx 30-40° core axis
		55-60	30-35		70	
70						
80					82	82-98 broken core
		60-65	30-35			talc sheen @ 87' (6 in. wide)
90					90	
		65-70	20-25			95-97.5 fault - talc seams
100					100	98-110 greenish white talc w/ minor magnesite
		65-70	20-25			
110						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HT94-3 ORIENTATION (Dip) (Az.) _____

LOGGED BY DGC % RECOVERY _____

▨ TALC ▨ MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
110		60-70	30-20			110.5-135 badly broken core
						110-150 greenish white talc & magnesite
120						120-123 - fault - talc gouge
		60-70	30-20			
130						131-133 - talc gouge - shear
						137.5 - broken core
140		60-65	20-10			
150		60-65	25-30			151-155 blocky broke core w/ talc shears & talc gouge
						156-170 greenish-white talc w/ lesser magnesite massive & not broken
160		55-60	40-30			
170		95-60	40-30			170-185 - massive, lt grey talc & crystalline magnesite
180		60-65	25-30			185-214 greenish-white massive talc with lesser magnesite
190		60-65	25-30			
200		60-65	25-30			204-205 - talc shear
210						@ 214.5 - 224 - serpentine / greenstone
220						

LAB ANALYSES - HISTOGRAM

% TALC 30 40 50 60 70 80 90 | % MAGNESITE 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HT 99-3 ORIENTATION (Dip) (Az.) _____

LOGGED BY D.G.C. % RECOVERY _____

TALC MAGNESITE

DEPTH	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
220						serpentine 214.5' - 224'
						224 - 261 - lt. grey - green talc & magnesite
						224 - 228 - badly broken core & lt. green talc - magnesite.
230						228 - 229.5' fault - mostly magnesite sand
						233 - 234.5 minor serpentine & talc
						231 - 246 - badly broken core
240						
250						talc shear
260						massive, 261 - 268 - serpentine - greenstone
	m/c					1' missing core
270						276.5 - 284.5 Intensely broken & faulted
						277.5 - 283 Missing core - faulting
						lt. grey - green talc w/ magnesite
280	m/c					abundant talc shears
		75-80				
290						292 - 296 - talc gouge - shearing & faulting
		75-80				297 - 300 Intense shearing & faulting
300	m/c					talc gouge
		>85				1' missing core
						301 - 312 - Mostly talc gouge
310		>85				abundant shearing & faulting.
						High grade talc - little to no magnesite
						300 - 315 mostly talc gouge
						317 - 318 serpentine lense
320		>85				323 - 327 mostly talc - abundant shearing
						327 - 335 - talc w some serpentine mixture - sheared throughout.
330						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HT 94-3 ORIENTATION (Dip) (Az.) _____

LOGGED BY DGC % RECOVERY _____ Page 4 of 4

▨ TALC ▨ MAGNESITE

DEPTH	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
335°		>85				337 - 335 - lt. green pearly talc shears
						335 - 350 - ~~mass~~ Intensely sheared talc - - - sheared throughout
340		>85				faulting / shearing throughout little to no magnesite
350						350 - 371 - mostly - massive unfaulted & unsheared serpentine w/ minor talc throughout
360						contains narrow seams of white talc. Serpentine
370						fault contact w/ schist @ 371. foliation ~70° to core axis
380						schist / phyllite
	E.O.H.					End of hole @ 388 (118.29m)

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT HIGHLAND TALC
DATE Sept. 13/94
HOLE NO. HT94-4
LOGGED BY DGC

CORE SIZE NQ
HOLE LOCATION
ORIENTATION (DIP) -65° (AZ.) 228°
% RECOVERY

RIG TYPE Long Year 38
COMENTS

TALC MAGNESITE

DEPTH ft	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Mineral(s))
20	CAVINGS					20-25 - cavings - pebble & blady broken & ground talc
	m/c					1 missing core @ 26'
30	m/c					27-30 bladly broken oxidized talc & magnesite
	m/c					31-34 missing core - cavings
						35-43 - missing core
40	m/c					43-44 mud / talc
	m/c					44-46 missing core
	m/c					46-48 oxidized talc mud.
						48-49 missing core
50						49-51 bladly broken oxidized talc & magnesite
	m/c					51-53 broken core, oxidized talc & magnesite
						53-57 missing - bladly oxidized
60						Intensely broken & oxidized
						62.5 start unoxidized talc
	m/c					63-64 unoxidized talc gouge
						64-67 missing core
	m/c					68-71 missing core
70	m/c					71-73 unoxidized talc gouge
		55-60	40-30			73-90 Lt grey-green talc/magnesite bladly broken & fractured
80						
		55-60	40-30			
90						
		60-65	30-25			
						100-101 missing core
100	m/c					
		65-70	20-30			103-104 very soft - talc gouge
						104-116 Lt green, massive talc & magnesite
110		60-65	20-30			
						@ 116 talc gouge
	m/c					missing core - fractured & shearing talc gouge @ 1198'
120						
		60-65	20-30			119.5-133' Lt green, talc & magnesite intensely fractured & broken
130						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE Sept. ~~HT94-8~~ 13/94 HOLE LOCATION _____ COMENTS _____

HOLE NO. HT 94 - ~~8~~ 4 ORIENTATION (DIP) -65° (AZ) 228°

LOGGED BY D.G.C. % RECOVERY _____

▨ TALC ▩ MAGNESITE

DEPTH m	LITHO LOG	VISUAL ESTIMATES TALC	VISUAL ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
130						
	magnesite sand					133-141 - magnesite sand w/ minor oxidized talc - probably washed magnesite sand from around casing.
140						
		85				141-147 Fracture core, mostly talc oxidized along fractures
						147-148 - talc gouge
150		55-60	30-40			148-163 Blady fractured & broken core, talc & magnesite partly oxidized along fractures.
160		55-60	30-40			163-164 magnesite sand - wash from casing
	sand					
						167-174 serpentine & greenschist.
170						
		>85				174-178 Lt green-whitish massive talc
180						
		>85				178-187 Lt. green-whitish massive talc, minor greenschist
						Core @ 188.5'
						187-203.5'
190	actinolite & talc					Lt green, actinolite needle crystals with talc
						minor talc throughout
200						
						203.5-218
						Contact dark brown gneissic schist @ 203.5 Highly foliated 40-60° to Core axis.
210						
220	greenstone siliceous					218-228. Lt green, siliceous greenstone w/ minor actinolite (tremolite).
230						228-245 - ~~sa~~ massive serpentine
240						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL
CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE Sept. 13/94 HOLE LOCATION _____ COMENTS _____

HOLE NO. HT94-4 ORIENTATION (Dip) _____ (Az.) _____

LOGGED BY BGC % RECOVERY _____

TALC MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL ESTIMATES TALC	VISUAL ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
240						228-245 - massive serpentine.
						245-246 - bladly broken core mixed talc & serpentine
		>85				246-249 lt. gry-white - talc bladly broken.
250						249-280 - mostly talc w/ minor serpentine
						@ 256 - narrow (6in) greenschist zone
260		>85				256-280 Intbdly broken, sheared talc
						Abundant shearing throughout - talcose shears.
270		>85				
						Bottom of hole contains a mixture of talc & serpentine cuttings
280	EOH					End of Hole @ 280' (85.37m)

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT Highland Talc — CORE SIZE NQ — RIG TYPE Long Year 38
DATE Sept. 7/94 — HOLE LOCATION — COMENTS
HOLE NO. HT94-5 — ORIENTATION (Dip) -55° (Az.) 52°
LOGGED BY DGC — % RECOVERY

TALC MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
20						0-26.5 Casing - Core point @ 26.5
	NVC	65-70	25-30			2 ft. missing core. Badly fractured & broken
30		65-70	25-30			missing core
	M/C					
40						Serpentine - greenstone
		65-70	25-30			Light green - greenish white w/ sections of rich talc & minor crystalline magnesite.
50						
		75-80	25-30			55-60 high grade talc - light green-white massive.
60						60-110 massive, lt-grn - greenish white talc w/ minor crystalline grey magnesite. Sections of high grade talc
		65-70	25-30			
70		65-70	25-30			
						78-85.5 greenish-white rich talc @ 79' narrow green schist (~4in.)
80		65-70	25-30			
						83-84 green schist - 84-90 intensely fractured & broken core
						85.5-86 green schist
	M/C					missing core
90		60-65	25-30			
100						
110		60-65				110-170 · massive grn-grn-white talc & lower crystalline magnesite w/ sections & seams of high quality blue-grn talc.
						180-131 badly fractured & broken, lt grey-grn talc & magnesite
120		60-65				
	M/C					125-126 missing core
130						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HT94-5 ORIENTATION (Dip) (Az.) _____

LOGGED BY DGC % RECOVERY _____ Page 2 of 3

▨ TALC ▨ MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
130		65-70	20-30			130 - 180 Lt grn - grnish white talc w/ lesser grey crystalline magnesite & w/ sections/seams of pearly grn translucent talc
140		65-70	20-30			Foliation appears range between 25-35° to core axis
150						
		65-70	20-30			
160						
		65-70	20-30			
170						
		65-70	20-30			
180						180 - 230 - Massive to sections of Fractured core. Lt grn-greenish white talc & Magnesite. With sections blue-green translucent talc
		60-70	20-30			Foliation varies from 25-35° to core axis.
190						
200						
		60-70	20-30			
210						209-215 Fractured core with sections of blue-green talc
		60-70	20-30			219-230 - Highly broken core w/ seams of talc gouge
220						
230		60-70	20-30			
240						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90 | % MAGNESITE: 20 30 40 50 60

GEOLOGICAL
CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE _____ HOLE LOCATION _____ COMENTS _____

HOLE NO. HT 94-5 ORIENTATION (Dip) (Az.) _____

LOGGED BY DGC. % RECOVERY _____

▒ TALC ▒ MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL ESTIMATES TALC	VISUAL ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
240						
		75-85	10-15			240 - 255 Intensely fracture with talc shearing
						@ 242 talc gouge (1 ft.)
		75-85	10-15			blue-green talc throughout
250						@ 250 talc gouge (1 ft.)
		75-85	10-15			
						@ 260.5 - 261.5 talc gouge
260		75-85	10-15			@ 263.5 - 269 - Talc - greenstone fault contact - light green talc shear & Faulting
270						@ 269 Fault contact w/ schist dark grey schist/phyllite from 269 - 294.
280						
						foliation 45-60° to core axis
290						
	E.O.H.					End of Hole @ 294' (89.63m)

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT Highland B TALC
DATE Sept. 7/94
HOLE NO. 94-6
LOGGED BY D.G.C.

CORE SIZE NQ
HOLE LOCATION
ORIENTATION (DIP) (AZ.)
% RECOVERY

RIG TYPE Long Year 38
COMENTS

⁘ TALC ⁘ MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
20						Core point @ 22' - Casing 0-22
		65-70	20-30			22-37 massive, l.grey-greenish white talc w/ crystalline magnesite.
30		65-70	20-30			
40		70-80	20-30			40.5-54 Intense shearing: blue-green schistosic talc - (S Rear zone)
	M/C					54-60 Badly broken core missing core (1ft.)
		70-80	20-20			
50						
60		65-70	20-30			60-87 Greenish white talc w/ minor magnesite, abundant sections of blue-green talc
70		65-70	20-30			
80						87-92 whitish talc gouge - intense shearing & faulting.
		65-70	20-30			
90						94-94.5 serpentine Fault gouge - badly sheared
		70-80				94.5-99 talc gouge - shearing
100						100 serpentine ~4in. thick
		70-80	20-30			100-123 - Badly broken - intense shearing & faulting - mixture of serpentine & talc gouge.
110		65-70	20-30			
120		65-70	20-30			122-132 - Badly broken core w/ fault-shearing & talc gouge.
						(Stop hole @ 134 - Rods starting to bind). (40.85m)
130						*132-134 No Core - Rods Binding - water loss - ABANDON HOLE

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL
CORELOG DATA SHEET

PROJECT HIGHLAND TALC
DATE Sept. 13/94
HOLE NO. HT 94-8
LOGGED BY DGC.

CORE SIZE NQ
HOLE LOCATION
ORIENTATION (Dip) -65° (Az.) 39°
% RECOVERY

RIG TYPE Long Year 38
COMENTS

TALC MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL ESTIMATES TALC	VISUAL ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
0						0-12.5 · casing
10	CASING					12.5-21' Massive serpentine
20		55	40			21-29 talc & magnesite - oxidized & bladdy texture.
30	m/c					29-31' missing core talc mud 31-32' 32-36 missing core
40	m/c	55	40			36-41 Lt. grey · massive talc & magnesite partly oxidized along fractures
50		50-55	35-40			41-54 Lt. grey, Fractured talc & magnesite - oxidized along fractures.
60		50-60	30-40			54-96 · Lt grey, mostly massive with minor fracturing, talc & magnesite
70						
80		50-60	30-40			
90		80-90				96-116 Fractured & sheared throughout Lt grey talc & magnesite 96-100 · talcose shears
100		80-90				112-115 · talcose shears
110						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE Sept. 13/94 HOLE LOCATION _____ COMENTS _____

HOLE NO. HT 94-8 ORIENTATION (DIP) (AZ.) _____

LOGGED BY D.G.C % RECOVERY _____

⁘ TALC ⁘ MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL GRADE ESTIMATES TALC	VISUAL GRADE ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
110		80-85				112-115 talcose & Foamy throughout
						116-122 Lt grey talc & magnesite only minor Fractures
120		60-65	30-35			123-125 talc shears
						125-130 mostly massive - Lt grey talc & magnesite.
130						
		50-60	30-40			130-160 partly sheared & broken, Lt. grey talc & magnesite
140						140-141 talc shears
		50-60	30-40			Foliation appears to range between 40-60° to core axis
150						153-158 abundant shearing - talcose schist - Lt grey talc & magnesite.
160		50-60	30-40			156-250
						Consistant Lt grey, mostly massive talc & magnesite throughout
170						173-176 sheared
180		50-60	30-40			Foliation tends to be 40°-50° to the core axis
190						176-250'
		50-60	30-40			Consistently - Lt grey talc & magnesite throughout - fairly massive with only minor fractures.
200						
210						
		50-60	30-40			
220						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL
CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE Sept. 13/94 HOLE LOCATION _____ COMENTS _____

HOLE NO. HT 94-8 ORIENTATION (Dip) (Az.) _____

LOGGED BY D.G.C. % RECOVERY _____

TALC MAGNESITE

DEPTH ft. 220	LITHO LOG	VISUAL GRADE ESTIMATES TALC	MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
		50-60	30-40			220-250 massive, Lt. grey talc & magnesite.
250		50-60	30-40			
240		50-60	30-40			
250						250-256 greenstone
						256-309' mostly massive w/ occassional fracture, talc & magnesite
260		50-60	30-40			
						@ 268 - narrow (¼ in.) greenschist lense
270						Lt. grey talc & magnesite throughout
		50-60	30-40			
280						
		50-60	30-40			
300						@ 301 minor greenschist mixed w/ talc & magnesite
						309-320 Lt grey, fracture & broken core, talc & magnesite
310		50-60	30-40			
						320-339 - Massive Lt. grey talc & magnesite.
320						
330						

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

GEOLOGICAL CORELOG DATA SHEET

PROJECT _____ CORE SIZE _____ RIG TYPE _____

DATE Sept. 13/94 HOLE LOCATION _____ COMENTS _____

HOLE NO. HT94-8 ORIENTATION (Dip) (Az)

LOGGED BY D.G.C. % RECOVERY

TALC MAGNESITE

DEPTH ft.	LITHO LOG	VISUAL ESTIMATES TALC	VISUAL ESTIMATES MAG.	SAMPLE INTERVAL	SAMPLE NUMBER	DESCRIPTION: (Texture, Colour, Alteration Accessory Minerals)
330						
		50-60	30-40			320-339 - massive lt grey, talc & magnesite.
						minor greenstone @ 336' "
340						339-355 Lt green - serpentine & greenstone schist
350						
						355-380
360		70-80				Mostly talc with a mixture of chlorite throughout
370		70-80				
380		70-80				Contact @ 380 with greenstone schist.
						380-389 - greenstone
390						Contact @ 389 with schist/phyllite
						389 ± EOH schist/phyllite foliation 30°-40° to core axis
400						
	EOH					End of hole @ 400' (121.95m)

LAB ANALYSES - HISTOGRAM

% TALC: 30 40 50 60 70 80 90

% MAGNESITE: 20 30 40 50 60

PILOT SCALE TRIALS OF HIGHLAND´S TALC

MADE BY FINNMINERALS OY, FINLAND

APRIL 1994

FINNMINERALS OY

SUMMARY

Finnminerals Oy made in September 1993 in its research laboratory the processing and application tests for a Canadian talcore owned by Highland Talc Minerals Ltd.

After the promising results of these tests it was decided to make pilot scale trials in Finland to produce filler, pitch control and coating grade talcs for paper industry.

Highland shipped four containers of talcore, totally about 80 tons, from Canada to Finland. This material was crushed, ground and flotated at the State Research Laboratory in Outokumpu to make talc-concentrate. This talc-concentrate, which was in slurry form, was then filtered, fineground to different grades, granulated and bagged in big-bags at Finnminerals Kaavi plant. All these trials were made in February 1994. The application tests for paper coating were made also in pilot scale at the Central Research Laboratory of Finnish Paper Industry in March.

The processing and application pilot trials of Highland's talc confirm the conclusion, which was made after the laboratory tests. Highland's talc can be processed and used same way as Finnminerals' talc. The only problem was the highly yellowish colour of the material. This caused low brightness and high yellowness in talcproducts. The yellowness is caused by iron hydroxide minerals, which indicate the surficial weathering of the deposit. Because of the highly oxidized talc the recovery of talc in processing was quite low. However, it is probable that in the deeper parts of the deposit unoxidized talc can be found.

We have stored nine tons of filler grade talc, five tons of pitch control/ coating grade talc and one ton of talc-concentrate in big-bags for further application tests. They are in granulated form except the concentrate which is as filtercake.

Sotkamo, Finland, April 8, 1994

FINNMINERALS OY

Hannu Haveri
Director, production

FINNMINERALS Oy Production /Ilkka TUOKKO 29.3.1994

HIGHLAND TALC

Mineralogy of talc ore and product Samples from pilot tests; February 1994.
References FM/Sotkamo averages.

	TALC ORE		CONCENTRATE	
	HTM	SMO AVERAGE	HTM	SMO AVER
Talc	56,0	55,3	94,9	95,3
Chlorite	7,0	7,1	1,7	2,3
Magnesite	35,0	34,9	3,1	2
Dolomite	2,0	1,0	0,3	0,3
Sulphides	0,03	**1,80**	0,02	0,1
Magnetite	**0,10**	0,01	0,03	0
Brightness %	56	61	66	76
Yellowness %	15	2,5	11	2,5
Ni total %	0,19	0,18	**0,25**	0,08
Ni HNO3 soluble %	0,05	0,15	0,02	0,01
FeO total %	6,0	5,5	**3,3**	2,0
Fe 1-N HCl soluble %	3,5	3,6	**0,31**	0,18

COMPOSITIONS OF MINERALS (WDS-analysis)

		SiO2	Al2O3	MgO	FeO	NiO	TOTAL (incl.H2O)
TALC	HTM	62,2	0,04	29,4	2,6	**0,22**	99,2
	SOTK	62,0	0,05	30,4	2,0	0,10	99,3

		MgCO3	CaCO3	MnCO3	FeCO3	TOTAL
MAGNESITE	HTM	78,2	0,1	0,1	**21,3**	99,7
	SOTK	87,9	0,2	0,2	10,6	98,9

CONCLUSIONS AND REMARKS:

The HTM-deposit is of the same type as the deposits of FM.

Talc in the HTM-sample is of the "fine-grained" -type compared to FM-deposits.

Low Brigthness and high Yellowness are caused by the presence of iron oxide and iron hydroxide minerals, the latter being indicative of surficial weathering, which even in glaciated terrain can reach significant depths (10-15 meters) along joints.

Low Sulphur ——> Few sulphides (no Ni-Concentrate); some magnetite.

Ni- and Fe-content of talc-mineral and -product are high.

Fe-content of magnesite is high —> HCl-soluble Fe in products is higher than in FM-deposits.

FINNMINERALS OY
Sotkamo plant

25.3.1994

J Olkkonen

THE PILOT PLANT CONCENTRATION OF HIGHLAND TALC ORE

1. GENERAL

The pilot tests were made in Technical Research Centre of Finland in Outokumpu town. The main features of the process circuit were similar to those Finnminerals uses for Finnish talc ores.
Before handling of Highland ore, the whole pilot circuit was cleaned and tested by running Finnminerals' ore until the process and product values were at the acceptable level.

2. CRUSHING

The total ore amount in four containers was about 80 tons. It was crushed in two stages by the jaw and gyratory crushers in the close circuit with the 10 mm vibrating screen and stored in the stockpile for further handling. The capacity was 15 - 20 t/h and power consumption about 30 kW. The crushing flowsheet is shown in appendix 1.

3. GRINDING AND FLOTATION

The grindig and flotation circuit is shown in appendix 2. The crushed -10 mm ore had a ball mill grinding and cyclone classification. The flotation process consisted of rougher and scavenger stages and three cleaning stages for rougher concentrate.

The process values for Highland talc ore were first found out in the test run.
The grinding report, screen analyses of the products and mass flow calculations of the flotation circuit are shown in app. 3 - 5.(Test n:o 7)
The grinding capacity was about 1.6 t/h and net energy consumption 13.5 kWh/t. The D_{80}value of the feed was 5.4 mm and the ground product 59 μm. The work index of the ore was 11.6 kWh/t.
In the flotation process solids content in feed was 18.4 % and in the cleanings 17.3, 23.6 and 10.7 %.
The corresponding flotation times were 15, 6, 19 and 13 min. Talc content in the test product was about 97 % and recovery by weight about 32 %.

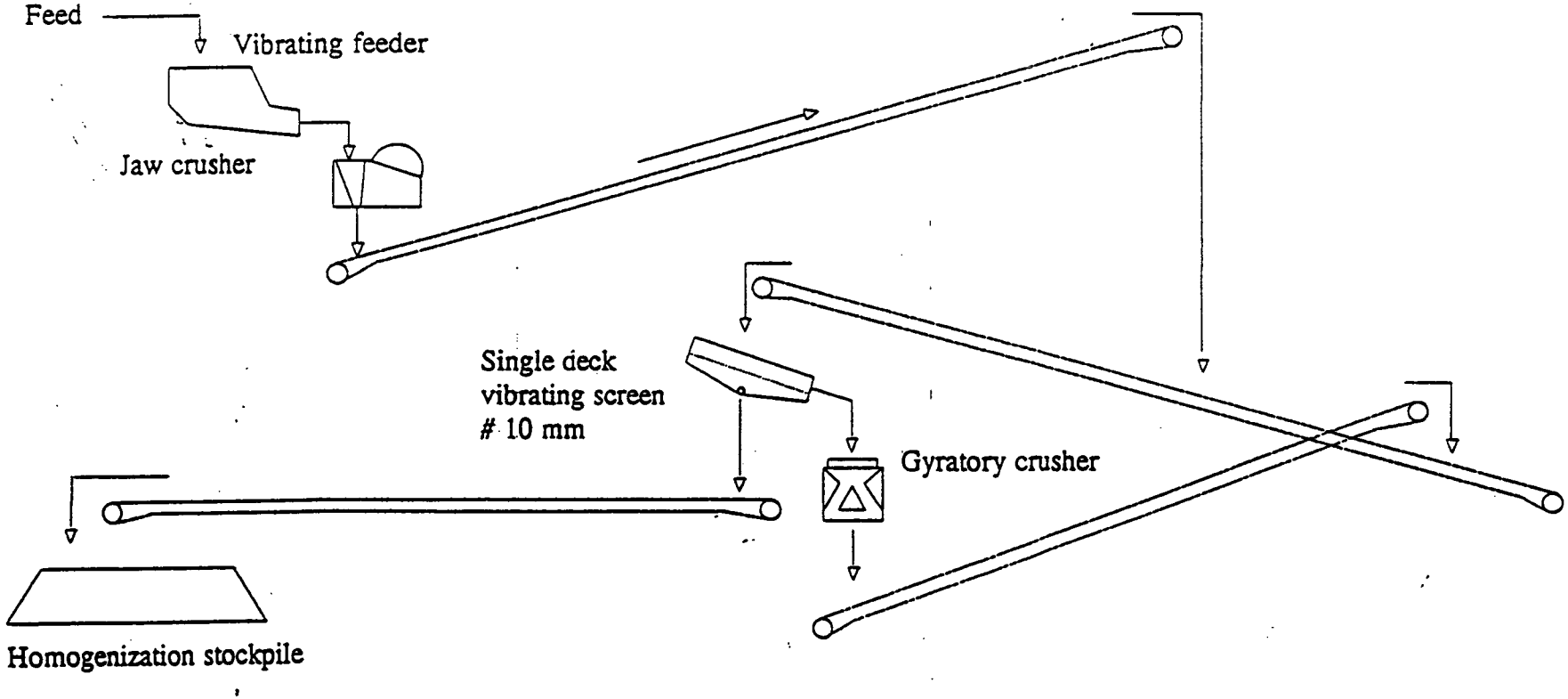
After the calibration of the circuit the whole Highland ore amount was processed continuously in three shifts and the summary of the grinding and screen analysis data can be seen in app. 6 - 7 (Test n:o 8). The flotation mass flow values were on the same level as in the test run because changes were not made during the running period. The recovery by weight in the pilot test was 32.7 %.

The final concentrate, about 25 tons, was pumped into the ∅ 8 m thickener and then transported to FM´s Kaavi plant for filtration and fine grinding.

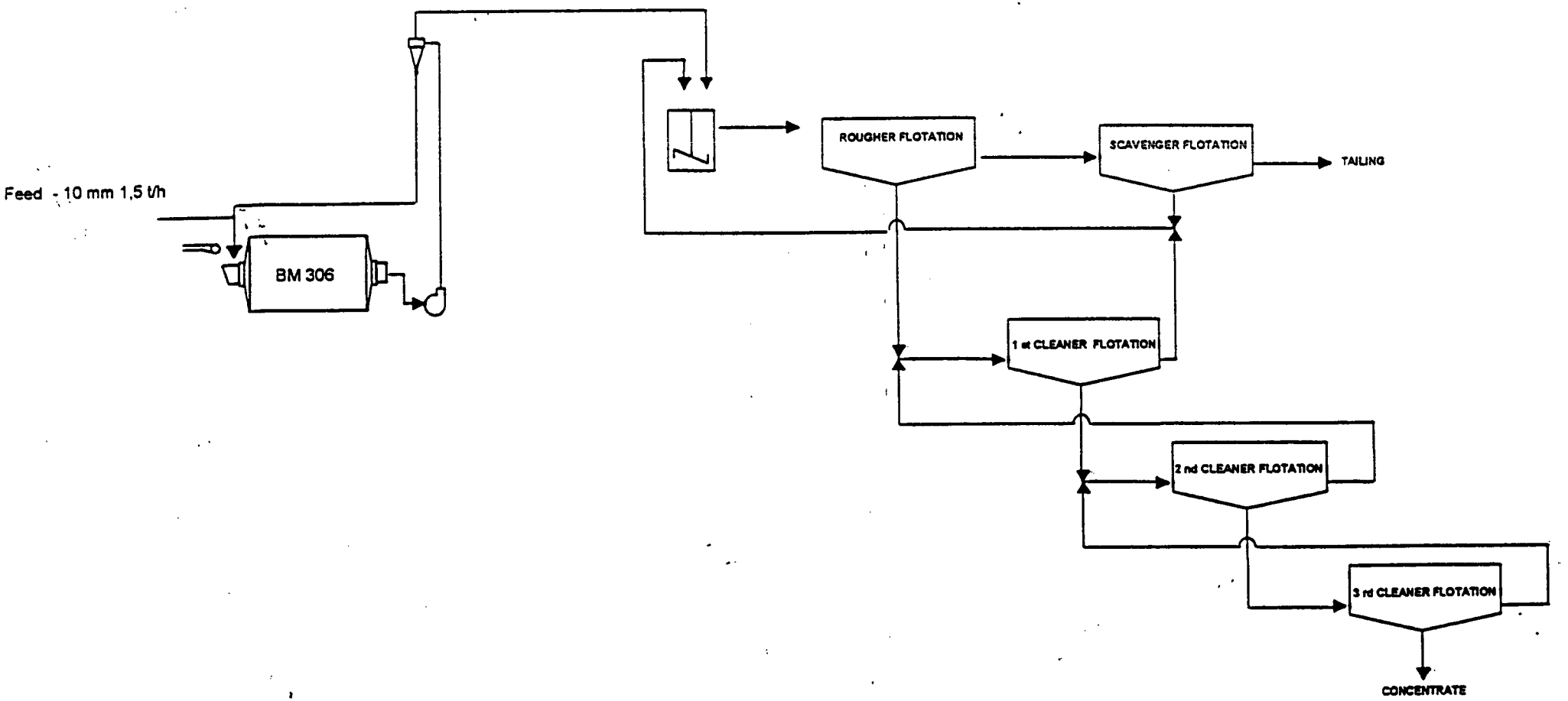
4. RESULTS

The feed, final concentrate and waste samples were collected once an hour in each shift and the analytical data from the combined samples is shown in app. 8.
Yellowness of the feed was even higher than in the lab tests in the autumn 1993. For that reason the brightness in the final concentrate remained 5 - 6 units lower than what is normal in that fineness.
Talc content, 97 %, was on the acceptable level but fine oxidized talc got into the waste product which had a talc content over 40 %. The recovery by weight was about 33 % in spite of the attempt to get it higer by increasing cemical and air in the flotation. From the feed without wethering impurities the recovery could be about 10 %-units higher.
The pilot test confirmed the comprehension of the similar process behavior between HL´s and FM´s ores thus giving a possibility to use the same technology for both ores.

FINNMINERALS OY, HIGHLAND TALC ORE PILOT
CRUSHING CIRCUIT



FINNMINERALS OY, HIGHLAND TALC ORE PILOT
BALL MILL GRINDING - CYCLONE CLASSIFICATION - FLOTATION



FINNMINERALS OY
TALC ORE PILOT, FEBRUARY 1994

TEST No.	:	7 ; BALL MILL GRINDING-CYCLONE CLASSIFICATION
DATE	:	1994-FEB-08
TEST MATERIAL	:	HIGHLAND-ORE
TARGET	:	Grinding for flotation
RUNNING PERIOD	:	KLO 7 - 24
TEST PERIOD	:	KLO 8 - 11

BALL MILL 4,47 bmu

Feed	t/h	:	1,60
Power draw, net	kW	:	21,6
Energy, net	kWh/t	:	13,5
Mill discharge	m3/h	:	6,60
	g/l	:	1640
	ka %	:	60,7
	ka t/h	:	6,57
Ball charge	kg	:	1450
	vol-%	:	6,1
Specific gravity	kg/l	:	2,80
Sreen ,#	mm	:	-
Screen O/F	m3/h	:	0,00
	g/l	:	0
	ka %	:	0,0
	ka t/h	:	0,00
Screen U/F	m3/h	:	0,00
	g/l	:	0
	ka %	:	0,0
	ka t/h	:	0,00
Cyclone diam.	mm	:	100
Vortex finder, diam.	mm	:	24
Apex finder, diam.	mm	:	25
Cyclone O/F	m3/h	:	3,35
	g/l	:	1320
	ka %	:	37,7
	ka t/h	:	1,67
Cyclone U/F	m3/h	:	4,25
	g/l	:	1720
	ka %	:	65,1
	ka t/h	:	4,76
Circulating load	t/h	:	4,76
	%	:	298

Crushed ore:

% - 0,500 mm	:	33,0
% - 0,074 mm	:	25,6
% - 0,032 mm	:	17,9
d80, mm	:	5,400

Mill discrarge:

% - 0,500 mm	:	98,3
% - 0,074 mm	:	69,9
% - 0,032 mm	:	43,9
d80, mm	:	0,108

Screen O/F:

% - 0,500 mm	:	0,0
% - 0,074 mm	:	0,0
% - 0,032 mm	:	0,0
d80, mm	:	0,000

Cyclone O/F:

% - 0,500 mm	:	100,0
% - 0,074 mm	:	89,3
% - 0,032 mm	:	58,8
d80, mm	:	0,059

BALL MILL GRINDING

Feed, d80	mm	:	5,400
Product, d80	mm	:	0,059
Power, net	kW	:	21,6
Energy, net	kWh/t	:	13,5
W i	kWh/t	:	11,6

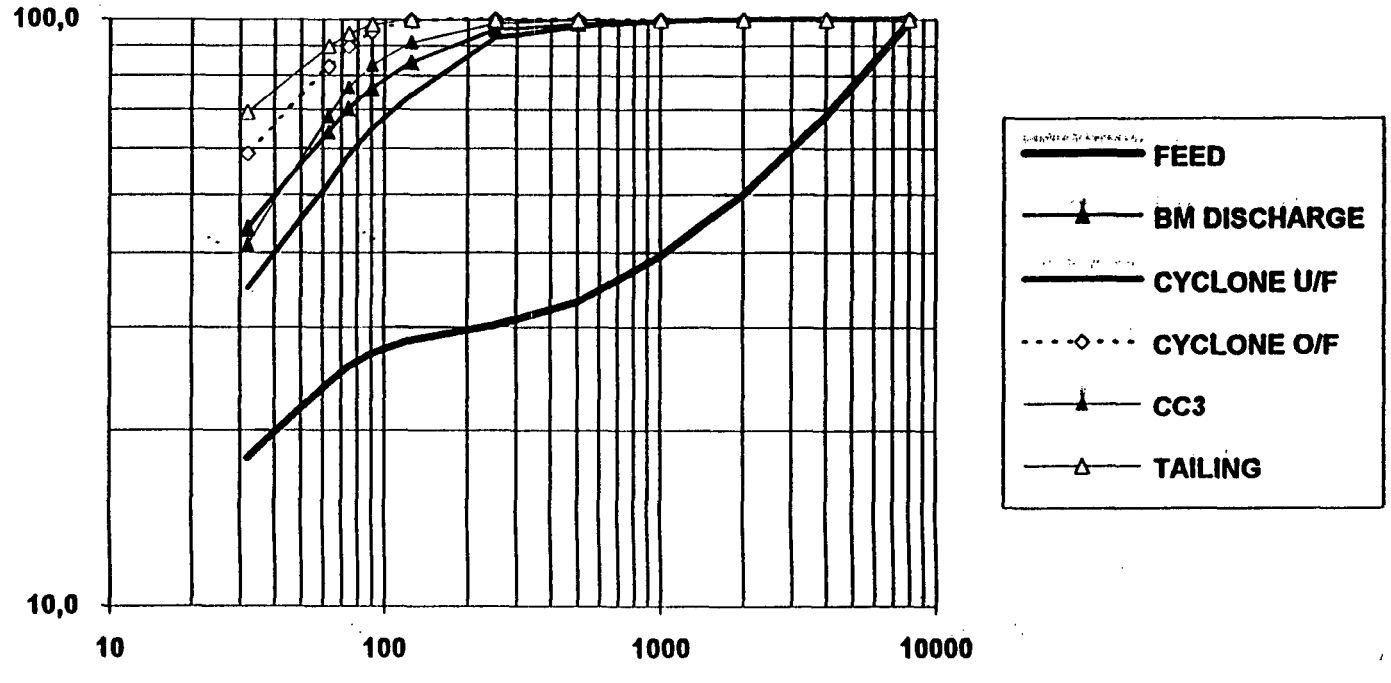
~~Dirc 10.3~~
APP 4.

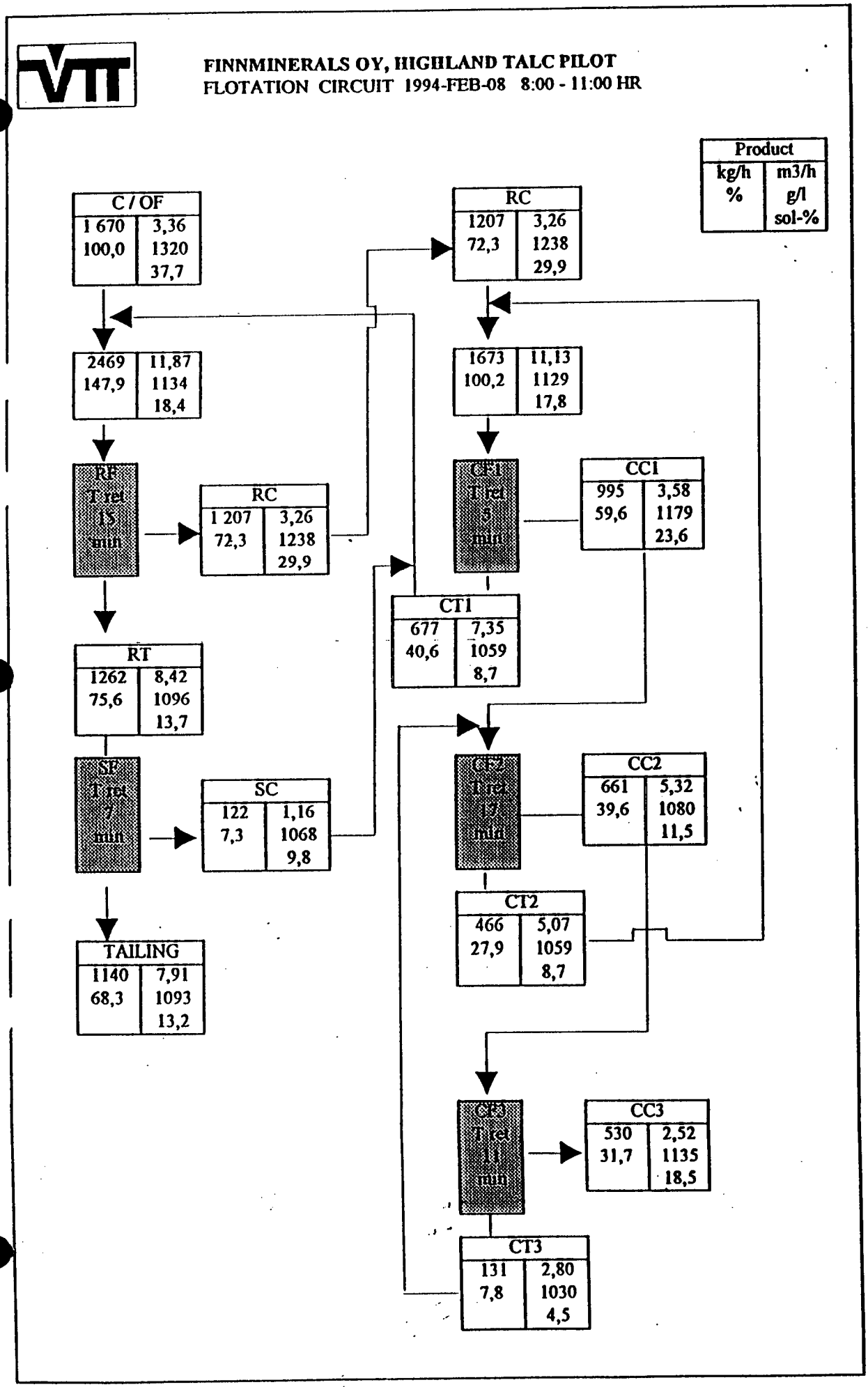
VTT

FINNMINERALS OY, TALC ORE PILOT

HIGHLAND-ORE 1994-FEB-08 8:00 - 11:00 HR
BALL MILL GRINDING-CYCLONE CLASSIFICATION-FLOTATION

SCREEN µm	FEED	BM PRODUCT	CY U/F	CY O/F	CC3	TAILING		
	PASSING %	PASSING %	PASSING %	PASSING %	PASSING %	PASSING %	%	%
8000	98,6	100,0	100,0	100,0	100,0	100,0		
4000	68,1	100,0	100,0	100,0	100,0	100,0		
2000	49,8	100,0	99,9	100,0	100,0	100,0		
1000	39,4	99,7	99,3	100,0	100,0	100,0		
500	33,0	98,3	97,3	100,0	100,0	100,0		
250	30,1	95,9	92,8	100,0	98,5	100,0		
125	28,4	84,0	73,8	99,7	91,3	100,0		
90	27,0	75,9	64,5	95,3	83,4	98,0		
74	25,6	69,9	58,2	89,6	76,2	94,6		
63	24,0	63,8	52,1	82,9	68,0	89,8		
32	17,9	43,9	34,9	58,8	41,3	69,1		




FINNMINERALS OY, HIGHLAND TALC PILOT
FLOTATION CIRCUIT 1994-FEB-08 8:00 - 11:00 HR
Product
kg/h
%
m3/h
g/l
sol-%
C / OF
1 670
100,0
3,36
1320
37,7
2469
147,9
11,87
1134
18,4
RF
T ret
15
min
RC
1 207
72,3
3,26
1238
29,9
RT
1262
75,6
8,42
1096
13,7
SF
T ret
7
min
SC
122
7,3
1,16
1068
9,8
TAILING
1140
68,3
7,91
1093
13,2
RC
1207
72,3
3,26
1238
29,9
1673
100,2
11,13
1129
17,8
CF1
T ret
5
min
CC1
995
59,6
3,58
1179
23,6
CT1
677
40,6
7,35
1059
8,7
CF2
T ret
17
min
CC2
661
39,6
5,32
1080
11,5
CT2
466
27,9
5,07
1059
8,7
CF3
T ret
11
min
CC3
530
31,7
2,52
1135
18,5
CT3
131
7,8
2,80
1030
4,5

FINNMINERALS OY

TALC ORE PILOT, FEBRUARY 1994

TEST No.	:	8 ; BALL MILL GRINDING-CYCLONE CLASSIFICATION
DATE	:	1994-FEB-08 - 1994-FEB-10
TEST MATERIAL	:	HIGHLAND-ORE
TARGET	:	Grinding for flotation
RUNNING PERIOD	:	2 * 24 hrs
TEST PERIOD	:	1994-FEB-08 - 1994-FEB-10

BALL MILL 4,47 bmu

Feed	t/h	:	1,50
Power draw, net	kW	:	20,9
Energy, net	kWh/t	:	13,9
Mill discharge	m3/h	:	6,50
	g/l	:	1610
	ka %	:	58,9
	ka t/h	:	6,17
Ball charge	kg	:	1450
	vol-%	:	6,1
Specific gravity	kg/l	:	2,80
Sreen ,# -	-mm	:	-
Screen O/F	m3/h	:	0,00
	g/l	:	0
	ka %	:	0,0
	ka t/h	:	0,00
Screen U/F	m3/h	:	0,00
	g/l	:	0
	ka %	:	0,0
	ka t/h	:	0,00
Cyclone diam.	mm	:	100
Vortex finder, diam.	mm	:	24
Apex finder, diam.	mm	:	25
Cyclone O/F	m3/h	:	3,18
	g/l	:	1280
	ka %	:	34,0
	ka t/h	:	1,39
Cyclone U/F	m3/h	:	4,20
	g/l	:	1680
	ka %	:	63,0
	ka t/h	:	4,44
Circulating load	t/h	:	4,44
	%	:	296

Crushed ore:

% - 0,500 mm	:	33,0
% - 0,074 mm	:	25,6
% - 0,032 mm	:	17,9
d80, mm	:	5,400

Mill discrarge:

% - 0,500 mm	:	98,2
% - 0,074 mm	:	67,8
% - 0,032 mm	:	43,1
d80, mm	:	0,117

Screen O/F:

% - 0,500 mm	:	0,0
% - 0,074 mm	:	0,0
% - 0,032 mm	:	0,0
d80, mm	:	0,000

Cyclone O/F:

% - 0,500 mm	:	100,0
% - 0,074 mm	:	91,8
% - 0,032 mm	:	60,6
d80, mm	:	0,056

BALL MILL GRINDING

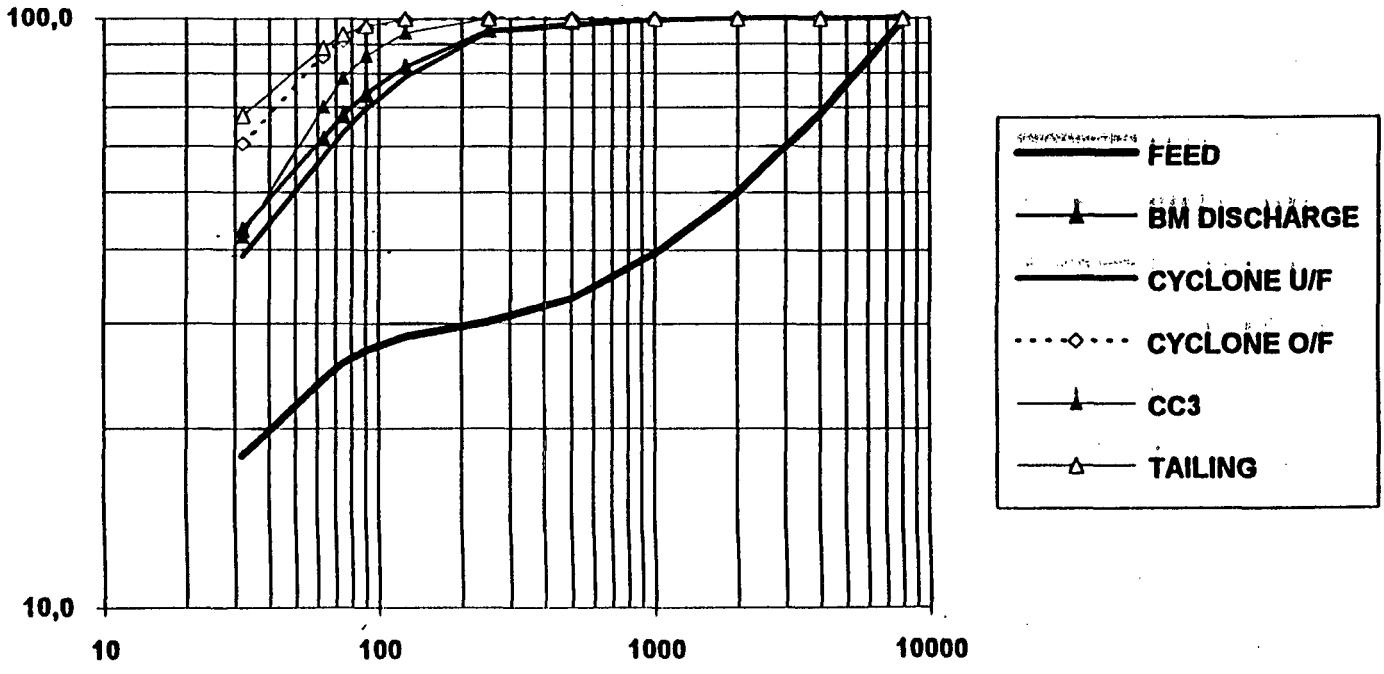
Feed, d80	mm	:	5,400
Product, d80	mm	:	0,056
Power, net	kW	:	20,9
Energy, net	kWh/t	:	13,9
W i	kWh/t	:	11,6

VTT

FINNMINERALS OY, TALC ORE PILOT

HIGHLAND-ORE 1994-FEB-08 13:00 - 1994-FEB-10 11:00 HR
BALL MILL GRINDING-CYCLONE CLASSIFICATION-FLOTATION

SCREEN µm	FEED	BM PRODUCT	CY U/F	CY O/F	CC3	TAILING		
	PASSING %	PASSING %	PASSING %	PASSING %	PASSING %	PASSING %	%	%
8000	98,6	100,0	100,0	100,0	100,0	100,0		
4000	68,1	100,0	100,0	100,0	100,0	100,0		
2000	49,8	100,0	99,9	100,0	100,0	100,0		
1000	39,4	99,7	99,3	100,0	100,0	100,0		
500	33,0	98,2	96,9	100,0	100,0	100,0		
250	30,1	95,4	94,5	100,0	100,0	100,0		
125	28,4	82,0	78,6	99,5	94,2	99,7		
90	27,0	73,8	69,5	96,2	86,0	97,0		
74	25,6	67,8	63,3	91,8	78,5	93,6		
63	24,0	61,8	57,2	85,7	69,9	88,8		
32	17,9	43,1	38,9	60,6	42,1	67,6		



Highland-talc flotationtest, analysis

	L.O.I	Talc.cont	Not soln.		In HN03					In 1 N HCl	In 1 N HCl	ISO	
	%	%	1 N HCl	S %	sol. Ni %	Tot. Fe %	Tot. Mg %	Tot. Ca %	Tot. Al %	sol.Fe%	sol. Mg%	Brightn %	Yellow %
FEED S4 KET 4506													
8.2.94, 8-11 (TEST 7)	21,5	61,1		0,024	0,044							56,1	18,3
8.2.94, 11-19	21	60,2		0,023	0,045							55,4	18,4
8-9.2.94,21-5	20,9	61,5		0,022	0,043							55,6	15,3
9.2.94,7-13	21	59,9		0,026	0,043							55,9	18,1
9-10.2.94, 23 - 9	20,5	61,2		0,024	0,044							55,4	18,2
CONCENTRATE													
KR3 KET 4506													
8.2.94,10.40 (TEST 7)	5,7	97,2	96,7	0,03	0,018	2,94	19	0,225	0,119	0,29	0,725	66	11
8.2.94, 13 - 19	5,8	97	96,4	0,03	0,018	3	19,5	0,225	0,129	0,31	0,75	65,2	10,8
8-9.2.94, 21-5	5,8	97	96,4	0,039	0,018	2,96	19,5	0,245	0,12	0,298	0,75	65,6	17,9
9.2.94, 7-13	5,7	97,2	96,4	0,04	0,019	2,96	19	0,24	0,123	0,308	0,775	65,8	10,8
9.2.94, 15 - 21	5,7	97,2	96,5	0,026	0,018	3	19	0,24	0,123	0,313	0,8	65,5	11
9 - 10.2.94,23 - 9	5,8	97	96,4	0,039	0,019	2,96	19	0,255	0,123	0,318	0,775	65,5	10,9
WASTE													
RJ KET 4506													
8.2.94, 10.40 (TEST 7)		42,5		0,011	0,054								
8.2.94, 13 -19		40,8		0,037	0,053								
8-9.2.94, 21 - 5		41,4		0,025	0,054								
9.2.94, 7 - 13		41,9		0,025	0,054								
9.2.94, 15 - 21		41,5		0,022	0,053								
9-10.2.94, 23 - 9		40,5		0,035	0,054								

26.3.1994

FINNMINERALS OY
Kaavi plant

O Hilli

14.3.1994

THE FILTRATION TESTS OF HIGHLAND TALC AT KAAVI PLANT

The filtration tests were made at Kaavi plant on 11th-12th of February 1994 with Larox pressure filters.

The flotated and thickened talc-concentrate was transported from Outokumpu to Kaavi plant by a tanktruck. The distance is about 40 kilometers.

Because of sedimentation during transport there were some difficulties to empty the truck. Dispite of these difficulties the filtration results were good. The average moisture content of filtercake was 9,3 %, which is lower than with our own concentrates.

We could not measure the capacity of filtration due to the difficulties mentioned earlier.

As a conclusion of the test we can say that the filtration of Hihgland talc can be done with Larox pressure filters without problems. The capacity of filters should be on the same level as with our own concentrates.

The results of the filtration tests are shown in the appendix.

FILTRATION

APPENDIX

		PAINESUODATUS (VTT koeerä)							
11,2-94 klo	Syöte tih. %	Suod n:o	Pump-paus s	Puris tus s	Kui-vaus s	Liete tih. %	Kos-teus %	Vaaleus	
17.00		III	70	280	440	10	9.7		
18.00		III	70	280	440	13	9,3		
19.00		II	70	280	440	20	9,4		
20.00		III	70	280	400	15	8.9	66,2	
21.00		II	70	280	400	17	6,8		
22.00		II	70	280	400	20	8,9		
23.00		II	70	260	400	16	9.3		
24,00		II	70	240	400	18	8.8	66.0	
DATE, TIME		FILTER Nº	PUMP. TIME	PRESS. TIME	DRYING TIME	SOLIDS CONT,	MOIST. CONT.	WHITENESS	

		PAINESUODATUS (VTT koeerä)							
12,2-94 klo	Syöte tih. %	Suod n:o	Pump-paus s	Puris tus s	Kui-vaus s	Liete tih. %	Kos-teus %	Vaaleus	
14,15		III	70	280	300	4			
		II	70	280	300		9,6	67,2	
14.35		III	70	280	300				
		II	70	280	300				
15.10		II	70	280	300				
15.25		III	70	280	300		12,6		
15.45		II	70	280	300				

Kosteus ka. 9,3 %
%

AVERAGE MOISTURE

Lopetus lukema t 6436,2

Aloitus -"- 6416,2

TOTAL WEIGHT 20,0 t

FINNMINERALS OY
Kaavi plant

H Jaakkola 14.3.1994

THE FINEGRINDING TESTS OF HIGHLAND TALC AT KAAVI PLANT

The finegrinding tests were made at Kaavi plant on 21st-22nd of February 1994.

The finegrinding of the filtered concentrate was done in series of two micronizing units. First step was done by a mechanical impact mill and the second step was done with a steam jet mill.

Because of the shortage of concentrate and relatively high losses of talc in various steps of full scale process, we could not get exact capacities and power consumptions.

Mechanical grinding

The intermediate product was ground close to the fineness of Finntalc M 30. The particle size distribution is shown in appendix I B.

The ginding capacity was about 3,0 tons/hour and the power consumption was about 110 kWh/ton.

Steam jet grinding

The pitch control grade and the coating grade were ground to the same fineness. Particle size distribution is shown in appendix II. The brightness of the product was 81,5 %.

The grinding capacity was about 3,2 tons/hour and the steam consumption was about 1,9 tons/ton of talc.

The filler grade was ground to the fineness of Finntalc F 10. Particle size distribution is shown in appendix III A. The brightness of the product was 80.8 %.

We did not use the full steam capacity of the mill in filler grade grinding and therefore the gringing capacity was low, about 3,0 tons/hour. With a full steam capacity the grinding capacity should be around 4,5 tons/hour. The steam consumption was about 1,5 tons/ton of talc.

All the products were granulated and stored in big-bags.
- pitch control grade and coating grade 5 tons, moisture content 12,3 %
- filler grade 9 tons, moisture content 9,2 %

RAEKOKANALYYSI

Liite IB

NÄYTE Välituote N:o 1 Highland 21/2-94

pvm 22/2-94 IB

tiheys _____ g/cm³ liuos _____ tiheys _____ g/cm³ viskosit. _____ cP _____

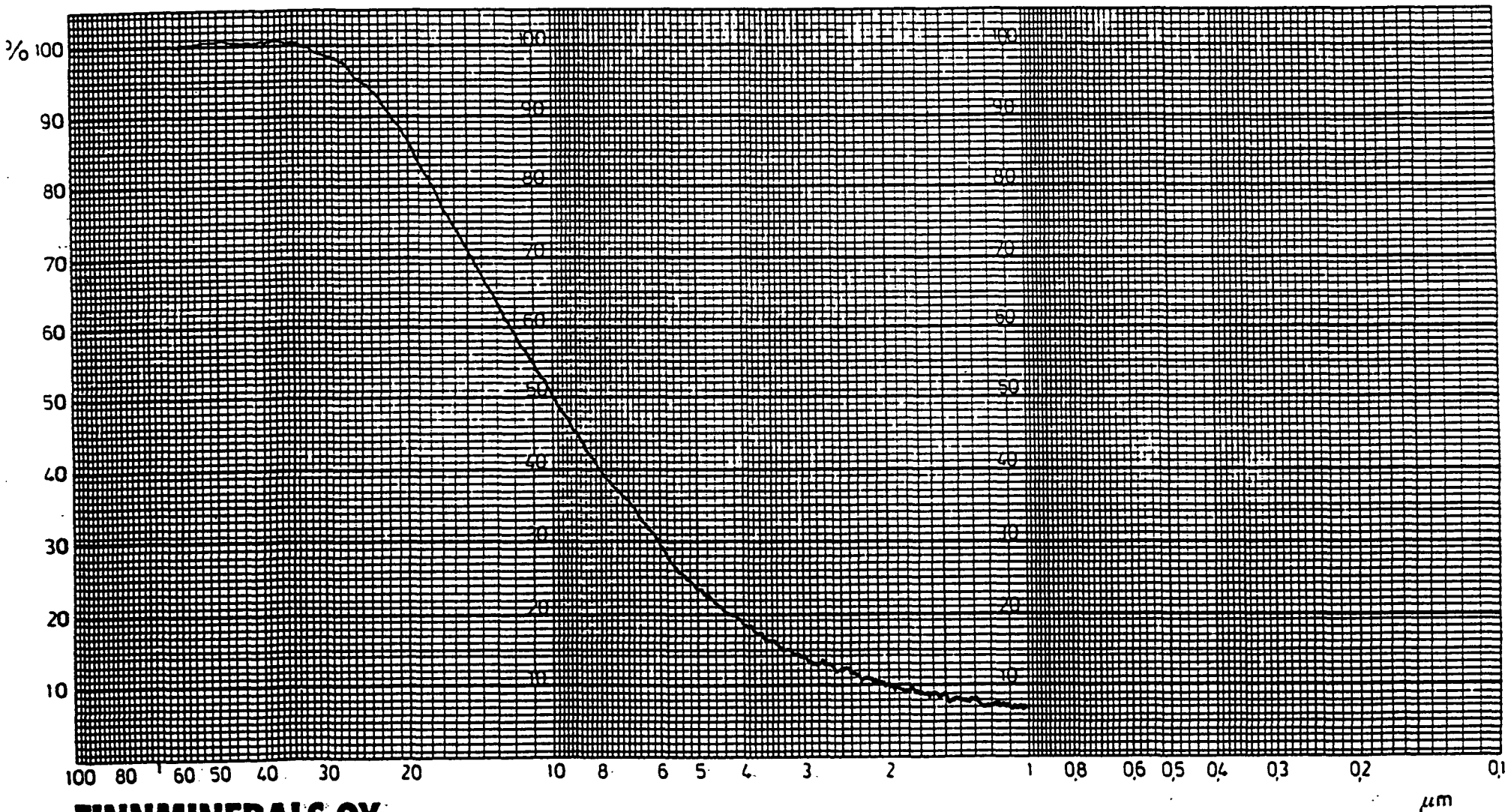
tekijä _____

näytteen valmistus PARTICLE SIZE DISTRIBUTION

lämpötila _____ C°

INTERMEDIATE PRODUCT

ohjelma _____ lähtö µm



FINNMINERALS OY

Kaavin tehdas

Laboratorio

20×100 12 93 JKP

Liite II

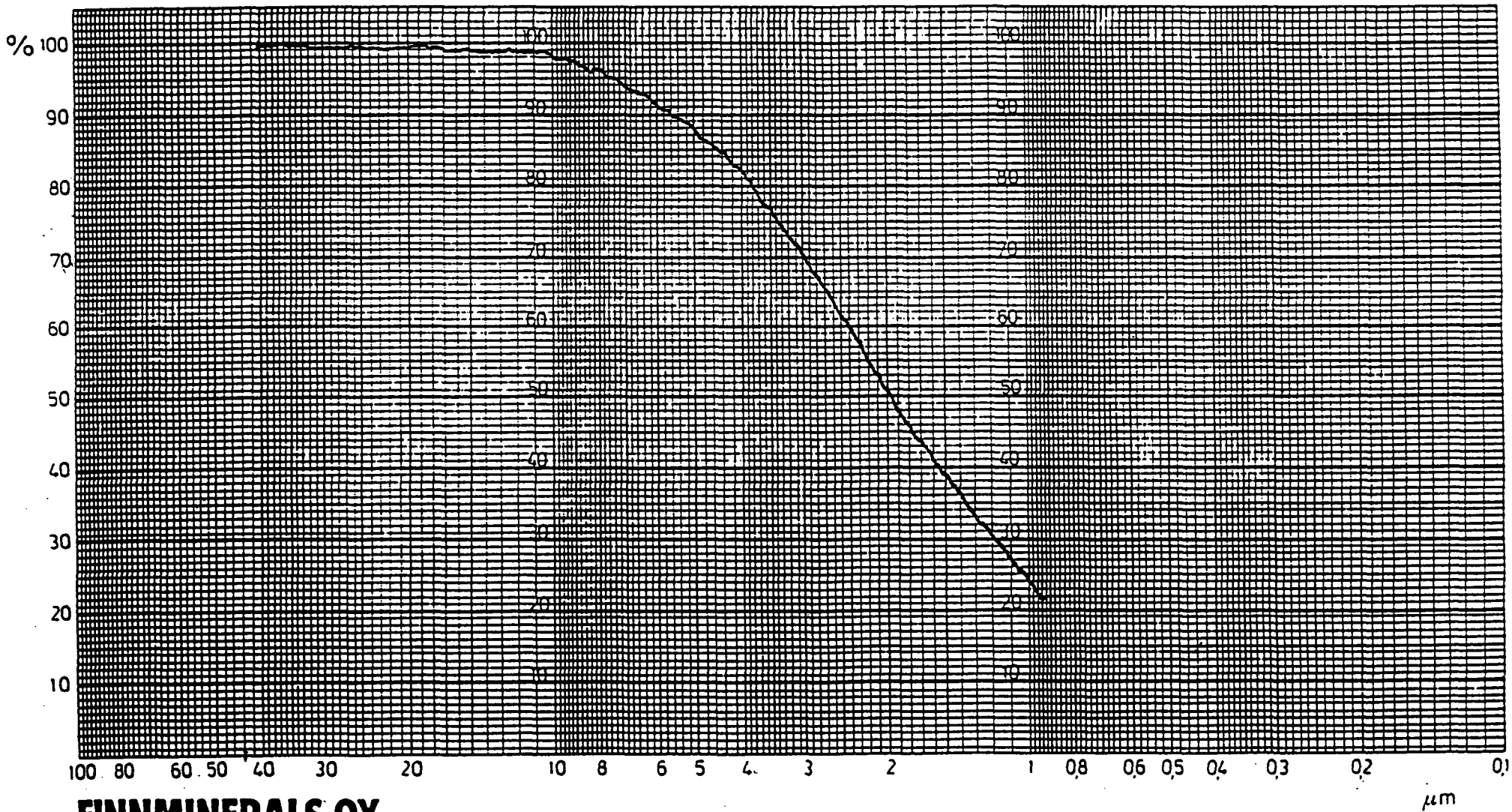
RAEKOKOANALYYSI

NÄYTE PK05 21/2-94 Highland pvm 22/2-94 II

tiheys ____ g/cm³ liuos ____ tiheys ____ g/cm³ viskosit. ____ cP ____ tekijä ____

näytteen valmistus Mylly I H-syöttö 5.8 t/h PITCH CONTROL lämpötila ____ C°

Jauhatuksen alipaine 12.0 kPa COATING GRADE ohjelma ____ lähtö ____ µm



FINNMINERALS OY

Kaavin tehdas

Laboratorio

20×100 12 93 JKP

Fillers = 81.5
Brightness

RAEKOANALYYSI

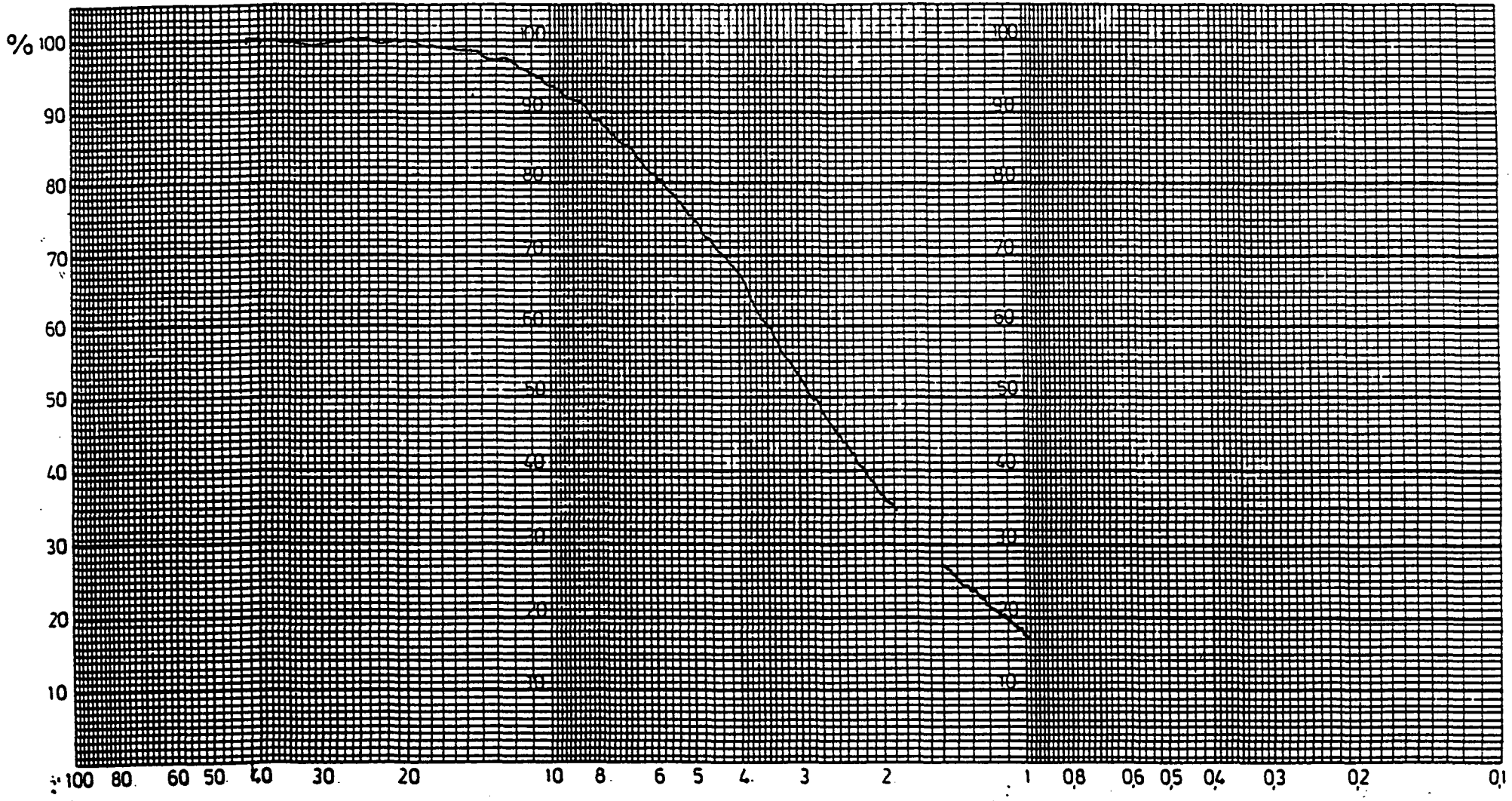
NÄYTE Highland F10 22.2-94 pvm 23/2-94

tiheys ____ g/cm³ liuos ____ tiheys ____ g/cm³ viskosit. ____ cP ____ tekijä ____

näytteen valmistus ____ lämpötila ____ C°

FILLER GRADE

ohjelma ____ lähtö µm



FINNMINERALS OY

Kaavin tehdas

Laboratorio

Vaaleus = 80.8

Brightness

20X100 12.93 JKP

HH

FINNMINERALS OY
R & D
H Leskelä

23.3.1994

HIGHLAND-TALC

PAPERCOATING TEST

PILOT TRIAL

ABSTRACT

Highland-talc was tested for LWC-rotogravure-papercoating. The referens was Finntalc C-10.

Highland-talc was grinded slightly finer than C-10. Highland´s brightness is lower.

Coating colours contained 75 % talc and 25 % clay. Highland´s finess caused a little higher viscosity.

In paper properties Highland´s brightness and Y-value is lower, and excitation purity both dominant wavelenght is higher. Other properties are at the same level.

The difference in brightness etc. is significant, and it can cause more costs for paper plants.

PROGRAM

From Highland-talcore was produced in pilot- and plant-scale grade for LWC-rotogravure coating test in the pilot plant.

The referens was Finntalc C10-slurry.

Highland-slurry was made with the pilot mixer using the standard recipe.

Base-paper was coated with three different coatweight. The coating colour contains 75 % talc and 25 % clay.

Coated paper was supercalandered with pilot calander.

Slurries, colours and papers was tested.

RESULTS

SLURRIES

Highland talc is slightly more grinded, and **particle size-distribution (Sedigraph)** - 5 um is 81 % (ref 78 %) and - 2 um is 48 % (ref 44 %), app 1.
Brightness-% is 76.3 (ref 84.0).
Other analysies are at the same level.

COATING COLOURS

Highland talc's colour with clay is a little more viscous,
Brookfield viscosity, 100 rpm, 1470 mPa.s (ref 1170),
Haake viscosity, 48900 1/s, 1. up, 34 mPa.s (ref 29).
The reason is Highland's finess.

INTERPOLATED PAPER PROPERTIES

Analysies for the coatweights 7.0 and 8.5 gsm are in the appendix 2.

With the **coatweight 8.5 gsm brightness** is 68.9 % H (ref 70.8), **Y-value** 74.3 % H (ref 75.3).
Excitation purity is 5.1 % H (ref 4.3), **dominant wavelenght** 574.7 nm H (ref 574.0).

Other analysies are at the same level **density** 1210-1220 kg/m3, **opacity** 89.9-90.3 %, **gloss** 61-63 %, **smoothness PPS 5** 1.15-1.28 um, **PPS 10** 0.76-0.84 um, **static friction** 0.23 and **specific volume resistance** 5600-5630 GOhm, **sp. surface resisrance** 800-920 GOhm cm and **rotogravure printability (Heliotest)** 98-102 mm.

FINNMINERALS OY
R & D
H Leskelä

APPENDIX 1

21.3.1994

PILOT-COATING TEST, HIGHLAND

SLURRIES		C10-REF	HIGHLAND
Brookfield viscosity, mPa.s			
	100 rpm	224	246
	50 "	216	268
	20 "	310	430
pH		10.3	10.4
Solids content-%		65.6	65.4
Conductivity, mS/m		88	76
Air content, v-%		4.1	5.1
Temperature, °C		23	23
Brightness-%		84.0	76.3
Sedigraph			
under 10 um		94	95
under 5 um		78	81
under 2 um		44	48
under 1 um		24	27
COATING COLOURS, after coating			
	(75 % talc, 25 % clay)		
Brookfield viscosity, mPa.s			
	100 rpm	1170	1470
	50 "	1860	2400
Haake viscosity, 48900 1/s, mPa.s			
1. up		29	34
1. down		23	25
2. up		23	23
2. down		23	23
pH		9.5	9.3
Solids content-%		57.0	57.2
Conductivity, mS/m		156	143
Water-retention, gsm		77	71

INTERPOLATED PAPER PROPERTIES (7 GSM)

	C10-REF	HIGHLAND
Blade pressure, bar	1.05	1.13
Grammage, gsm	54.0	53.0
Density, kg/m3	1 202	1 195
Heliotest, mm	97	93
Brightness-%	70.4	68.4
Opacity-%	89.3	89.7
Y-value-%	75.2	74.0
Dominant wavelenght, nm	574.0	574.6
Excitation purity-%	4.52	5.30
Gloss-%	60	58
Smoothness, PPS, 5 kp/cm2	1.26	1.35
Smoothness, PPS, 10 kp/cm2	0.83	0.88
St. friction-1.	0.23	0.22
St. friction-5.	0.22	0.22
St. friction-1.-5.	0.22	0.22
Sp. surface resistance, GOhm cm	810	905
Sp. volume resistance, GOhm	5 332	5 741

INTERPOLATED PAPER PROPERTIES (8.5 GSM)

Blade pressure, bar	0.99	1.02
Grammage, gsm	55.4	54.6
Density, kg/m3	1 220	1 206
Heliotest, mm	102	98
Brightness-%	70.8	68.9
Opacity-%	89.9	90.3
Y-value-%	75.3	74.3
Dominant wavelenght, nm	574.0	574.7
Excitation purity-%	4.33	5.12
Gloss-%	63	61
Smoothness, PPS, 5 kp/cm2	1.15	1.28
Smoothness, PPS, 10 kp/cm2	0.76	0.84
St. friction-1.	0.23	0.23
St. friction-5.	0.23	0.22
St. friction-1.-5.	0.23	0.23
Sp. surface resistance, GOhm cm	797	917
Sp. volume resistance, GOhm	5 600	5 625