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British Columbia Division

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April 26th, 1932.

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A. M. Richmond, Esq.,
Assistant Resident Engineer,
Non-Metallics Survey,
Bureau of Mines,
Victoria, B. C.

Dear Sir:

re White Empress Mineral Claim

We have received a reply from Dr. Louis Navias of the General Electric Research Laboratory, copy of which we enclose.

You will see that he evidently figures there is too much lime content in our magnesite. As you know, the sample we sent was some of the magnesite that had been lying at the railway station for the last three or four years and although samples were taken from various parts of the pile, it may be that the magnesite has deteriorated in the meantime. Do you think there would be any advantage in having a fresh sample taken from themineral claim itself and forwarded to the General Electric Co. to see if it will test up closer to the analysis given by Mr. Carew-Gibson in 1917?

Any suggestions you have to make in this regard will be much appreciated.

Yours truly,

THE CANADIAN CREDIT MEN'S TRUST ASSOCIATION LIMITED
Trustee

per

ARB/MP.
Encl.

PROPERTY FILE

Hydromagnesite

May 9th, 1932.

A.H. Bain, Esq.,
Canadian Credit Men's Trust Ass'n.,
218-224 Pacific Building,
744 West Hasting Street,
VANCOUVER, B.C.

Dear Sir:-

Re White Empress Mineral Claim.

I have your letter of the 26th ultimo containing information and an enclosure on the White Empress Mineral Claim, and as I suggested to you over the phone when recently in Vancouver, I doubt very much if your sample would have deteriorated very much since the hydromagnesite was mined.

Unless you can get the deposit sample very cheaply say Mr. Mackay, who I understand is at Clinton, I would not advise you to have the deposit re-sampled.

I am,

Yours very truly,

Non-Metallics Engineer.

AMR/B

PROPERTY FILE

BUREAU OF MINES
Office of Prov. Mineralogist
Rec'd JUL 21 1931
Ans'd

WHITE EMPRESS MINERAL CLAIM

This deposit of hydro-magnesite is located in Lillooet District on Watson Lake, near 105 Mile House, Cariboo Road, British Columbia, within one mile of Watson Siding on the Pacific Great Eastern Railway, which is 269 miles from Vancouver.

The claim is Crown Granted and free from all encumbrances, and covers 50 acres of ground in which are several patches of hydro-magnesite which cover from five to seven acres in the form of surface deposits of very fine white powdered material ranging in depth from two to seven feet. This material is bare of all vegetation and can be easily dug with a shovel and cheaply hauled by wagon or motor truck to the railway shipping point.

The White Empress claim is estimated to contain from 40,000 to 45,000 tons of the purest grade of material, which has been proved by a large number of test holes made over the area of the deposits. Appended are some analyses of the crude material and of the calcined results obtained by the former owners from their Vancouver calcining furnace. From these the extreme purity of this material will be noted.

Mr. Carew-Gibson also reports the following analysis of a fair commercial sample taken by him in 1917:-

After heating to a temperature of 100 C.		
Silica	0.76	
Magnesium oxide	2.24	
Ferric oxide	0.04	
Alumina	0.49	
Lime	Nil	
Magnesium carbonate basic	96.47	equivalent 44.52 MgO
	100.00	

Ignition loss 50.65
The moisture content will vary from 20% in the spring and fall to practically nil in the heat of summer.

Magnesite and its products are used in the manufacture of carbon dioxide, in the digestion of wood pulp, in the manufacture of Sorel cement, as a refractory lining for basic steel and other furnaces, magnesium flooring, stucco, imitation marble, in the manufacture of chemicals, and in other ways. The metal magnesium forms a very useful alloy with aluminum and the powdered metal is used in the manufacture of flares, etc.

This deposit is probably sufficiently pure for nearly all chemical uses without any costly process being required to get that result.

The material can be loaded into box cars on the railway at its place of origin in Cariboo and shipped in bulk to the market, but if needed in the calcined form, to save freight, it should first be calcined before being despatched on a long rail shipment.

Reference to this deposit will be found in Memoir 118 of the Geological Survey of Canada, entitled "Mineral Deposits between Lillooet and Prince George, British Columbia" by Leopold Reinecke, and published in 1920. In that report this deposit is referred to as the "Watson Lake deposit" and appears as No. 20 on the index map shown on Page 3. References occur regarding the claim throughout the text, but at Page 46 is a special report regarding this particular claim.

Reference is also made to the claim on Page 11R of the Annual Report of 1898, Geological Survey of Canada, where Dr. Dawson gives a report as to the assay of the mineral.

A further detailed report regarding this and similar deposits is given in the Canadian Chemical Journal of June and July, 1919, Vol. 3, Nos. 6 and 7, this article being by L. Reinecke, who made the Government survey referred to above.

Further information can be obtained from

THE CANADIAN CREDIT MEN'S TRUST ASSOCIATION LIMITED
222 Pacific Building,
Vancouver, B.C.

PROPERTY FILE

RE; WHITE EMPRESS MINERAL CLAIM

Copied from Page 11R, Geological Survey of Canada, Annual Report 1898.

The material examined consisted of pure white, more or less finely compacted, yet readily friable, aggregate of very fine crystaline particles with a few delicate intermingled rootlets. Its analysis afforded Mr. R.A.A.Johnston the following results:-

Carbon dioxide	37.03
Magnesia	43.71
Lime	.10
Alumina	0.02
Ferric Oxide	0.04
Phosphorous pentoxide	0.50
Silica (soluble)	0.38
Water with a little organic matter	17.79
#Insoluble residue	1.53
	100.90

#Insoluble consisted of:

Silica	1.36
Alumina	0.10
Ferric oxide	0.03
Lime	0.03
Magnesia	0.02
	1.55

The above analysis obtained from samples submitted by Dr. Dawson, Director of the Geological Survey of Canada in 1898 taken from the deposit now known as the White Empress Mineral Claim.

Analysis of calcined hydro-magnesite from White Empress mineral claim, Lillooet, district of British Columbia.

Provincial Bureau of Mines, Victoria, B.C.

Moisture	1.5
Loss on ignition	7.5
Lime	1.8
Silica	5.6
Magnesium oxide	83.4
Iron	trace

Dominion Government Chemist, Ottawa.

Magnesia	83.00 %
Lime	1.15 "
Oxide of Iron and Alumnia	.90 "
Carbonic Acid (CO^2)	2.58 "
Insoluble residue	5.80 "
Moisture and combined water	5.78 "
	99.19 "

American Magnesium Corporation #1 Laboratory

		%
H20	1.00	1.10
lgn (CO2)	5.20	5.20
Si02	xxx	7.80
Al203	xxx	1.18
Fe203	xxx	.32
CaO	xxx	.70
MgO (Diff.)	xxxx	83.70

Deavitt Laboratories (Consulting Chemists & Chemical Engrs.) 20980 La Salle Street, Chicago, Ill.

Silica	.09 %
Ferric Oxide	.48 "
Alumina	7.43 "
Magnesia	87.42 "
Loss on Ignition	2.72 "
Soluble matter	1.65 "
	100.00

The four above analyses were obtained by the Pacific Roofing Company who submitted samples of the material after it had been calcined in their furnace, in Vancouver.

GSC Mem 118 "Mineral Deposits Between Lillooet + Prince George BC"
Reinecke, L. 1920

there is an impure earth generally cemented to hard rock and resting on sand or boulders. Analysis 2, Table III, represents the composition of the cream-coloured earth and analysis 5, Table III, shows the composition of the whole of the white and the upper part of the cream-coloured layer. Analysis 3, Table III, is of the cemented layer at the base, and analysis 6, Table III, of the lower part of the cream layer and the base. There is slightly less silica and a very much greater proportion of lime in the cemented base than in the overlying cream-coloured layer. In the cream-coloured layer there is more silica and lime than in the overlying hydromagnesite. The estimated amount of white material in area No. 3 is 78,900 tons.

Area No. 4 covers 8,200 square yards. In two openings the white layer varied from 12 to 18 inches in thickness. Beneath this was a 6-inch layer of brown sand underlain by a foot or two of cream-coloured earth. The estimated amount of white is 3,500 tons.

Area No. 5 covers 56,000 square yards. The depth of white material varied from 12 to 21 inches with an average of 15 or 16 inches. The calculated amount of white is 25,920 tons. Below this is granular, cream-coloured material to a depth nearly everywhere of 4 feet from the surface, under which is cemented material. In one hole the cemented material was penetrated and in this case, grey and brown clay extended downwards from a depth of 5 feet 8 inches; the water level was reached at a depth of 7 feet 1 inch. The total amount of commercial hydromagnesite in this area is estimated in round numbers at 114,000 tons. The water level lies well below the best material. These deposits are 16 miles distant over a road of good grade from Chasm station at 59 Mile House. From Chasm to Squamish is about 180 miles.

Watson Lake.

There are five small areas at Watson lake (Figure 6), all owned by A. E. Carew-Gibson of Vancouver. Area No. 1 lies on low ground and covers 2,250 square yards. An auger hole gave the following section: cream-coloured, sticky hydromagnesite 2 feet thick underlain by 2½ feet of greyer to nearly white material of the same general character; under this, yellowish earth with white particles for 1½ feet resting on green clay at a depth of 5½ feet from the surface. Water stood at a level of 4½ feet below the surface and the material just above was greenish. The estimated amount of the two upper layers is 3,720 tons.

Area No. 2 covers 1,050 square yards. An 8-foot auger hole showed (*a*) white material, 18 inches thick, containing 535 tons; underlain by (*b*) 27 inches of yellowish earth; this by (*c*) 6 inches thick, browner than (*b*) and full of grit near its base; (*d*) 27 inches white like (*a*) with some sand particles, water present at the base; (*e*) 9 inches of browner earth; (*f*) 9 inches of whiter earth than (*e*). At the base of (*f*), 8 feet from the surface, the material was cemented hard and the hole was abandoned.

Area No. 3 covers about 7,300 square yards. According to the owner the average depth of the white, upper layer is about 23 inches. Some of this is grey or cream-coloured rather than white. Below is cream-coloured to brown material. The depth of the whole deposit varies greatly. The owner states that he found it to be 85 inches deep in one place with 26

PROPERTY FILE
92P07W-04
GSC Mem 118 1920.

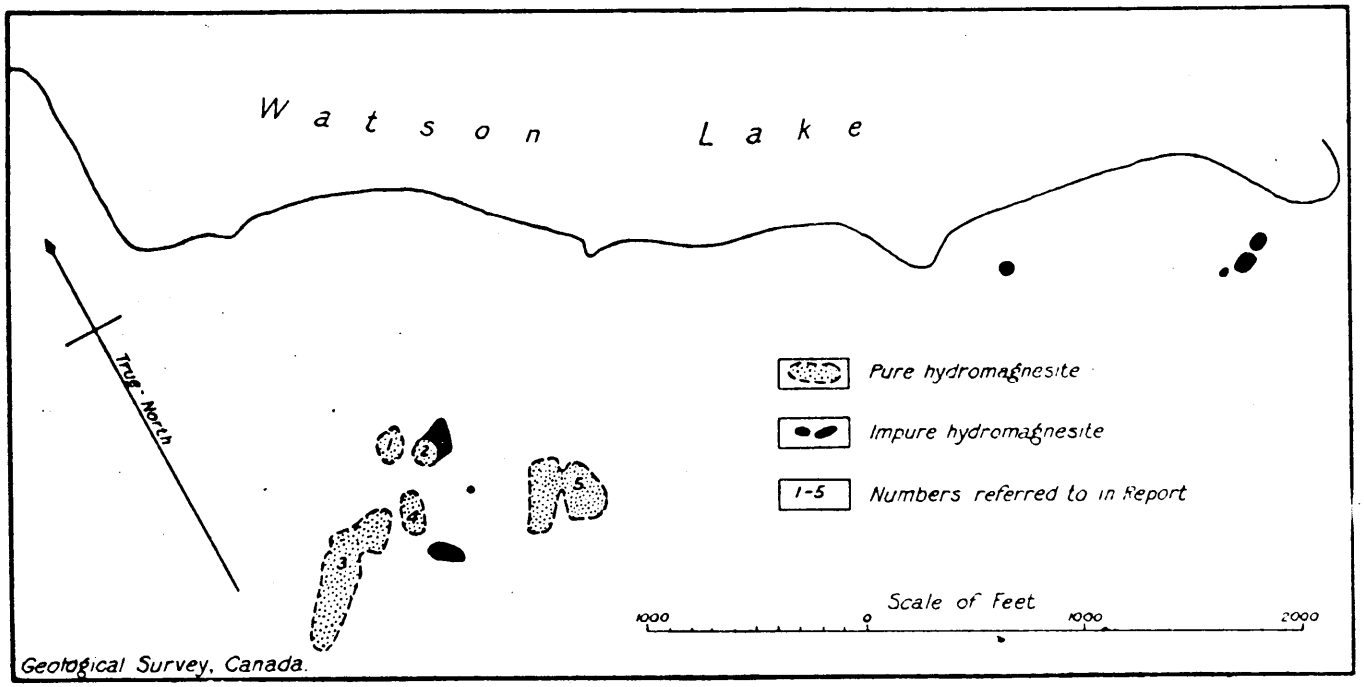
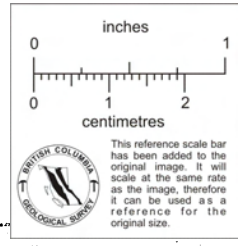


Figure 6. Hydromagnesite deposits at Watson lake, Lillooet district, British Columbia.



GSC Mem 118 "Mineral Deposits. Between Lillooet & Prince George, BC"
Reinecke, Leopold 1920

inches of white material on top, the base lying on dark grey mud. The writer found the base at 54 inches toward the other end of the deposit. The amount of commercial magnesite is estimated at 4,570 tons.

Area No. 4 covers about 1,500 square yards and the upper layer of pure material has an average thickness of 16·5 inches. Below this in one hole there is 3 feet 6 inches of yellowish hydromagnesite becoming harder and carrying more grit toward the base; the same earth but with more grit and brown colour continued to 8 feet 6 inches from the surface. Under this was 6 inches of reddish earth with freshwater shells and carbonaceous remains of roots and seeds. At the very base a plastic green clay was penetrated to a depth of 15 inches. There are 680 tons of the upper layer here.

Area No. 5 covers 8,950 square yards. Three holes in the east half showed fairly pure material from the surface down to 60, 48, and 37 inches, respectively, with black specks showing toward the surface. In one hole a band of yellowish material separated a top layer of white from a 2-foot band of white below. Below to the bottom of the deposit at 7 feet 3 inches, was impure brownish earth. In another of the three holes the material from the base of the fairly pure hydromagnesite became gradually dirtier down to the bottom of the deposit at 7 feet 6 inches. In the third bore-hole, with 60 inches of white material, the underlying earths gradually changed in colour from grey to pink and the bottom of the deposit was at 8 feet 10 inches. The white and pink earths overlay a green clay with freshwater shells. In the west end of this patch a hole showed grey-white material with black specks to 54 inches. From there it was white, but with much silica to 6 feet. Below this there was clayey material. The amount of the upper white material is calculated to be 13,232 tons.

The total quantity of commercial magnesite at Watson lake is in round numbers 23,000 tons. The quality of the upper white layer is expressed in analyses 4 and 5, Table II, and analysis No. 8, Table III. It is uniformly low in lime, but the silica content varies as it does at Meadow lake, and is high in places.

The Watson Lake deposits are about one mile from the railway grade and below it in elevation. The shipping point would be about 225 miles from Squamish.

Riske Creek.

The area on lot 178, Riske creek, owned by S. M. Becher, Riske Creek, covers 10,000 square yards. One auger hole showed white to cream-tinted hydromagnesite to a depth of 33 inches; from there down to 4 feet 2 inches the earth became gradually browner. At that depth there was brown clay. The estimated tonnage of the white is 6,900 tons, but this is based on only one opening, and may be much less. An analysis of material from the upper 2 feet in the auger hole indicates magnesite of very good quality, Table II, analysis 6.

The deposit on lot 1188, owned by A. E. Carew-Gibson of Vancouver, covers 26,000 square yards, of which 7,775 square yards is covered by white hydromagnesite standing slightly higher than the remainder. Two holes in the pure earth showed white material to depths of 2 and 3 feet, respectively. Below this the earth became browner and dirtier looking. The holes were not bored below 3 feet 7 inches. Analyses made from the material from one of the holes, 0 to 26 inches from the surface, is given in

GSC MEM 118

Table II.—Analyses of the Better Grades of Hydromagnesite.

No.	—	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	CO_2	SO_3	Cl	H_2O above 105°C	H_2O below 105°C	Total	Calcium carbonate	Gypsum	Magnesium carbonate plus water of crystallization
1	Deposit at Clinton, Figure 3, locality 3, 0 to 24 inches from surface	2·30	0·63	0·13	.....	41·60	0·22	.....	35·88	0·36	trace.	17·53	1·12	99·77	0	0·7	94·9
2	Centre main deposit at Meadow lake. Figure 5, locality 3, 0 to 15 inches from surface	4·00	1·36	0·14	0·23	41·38	1·32	0·14	37·67	.....	.....	12·12	1·48	99·84	2·4	.....	90·2
3	Average of five samples, 0 to 2 inches from surface, deposits 3 and 5, Meadow lake	1·22	0·67	0·18	0·63	40·56	1·26	.....	35·95	.....	.....	18·00	1·45	99·93	2·3	.....	93·6
4	From east end of easterly deposit Watson lake, Figure 6, locality 5, 0 to 36 inches from surface	4·62	0·16	0·16	.....	43·17	1·14	.....	43·64	0·51	trace.	5·26	1·42	100·10	1·4	1·0	91·26
5	From Watson lake, exact locality unknown	1·73	0·12	0·07	.....	43·73	.....	.....	37·03	.....	.....	17·79	.....	100·90	0	0	98·55
6	From centre of deposit, lot 178, Riske creek, 0 to 24 inches from surface	1·85	0·48	0·20	0·16	41·74	0·17	.....	40·85	0·11	none.	12·98	1·67	100·21	0·2	0·2	95·4
7	Towards southeastern end of deposit, lot 1188, Riske creek, 0 to 26 inches from surface	1·22	0·48	0·25	0·09	41·14	0·10	.....	37·70	0·08	none.	17·78	1·28	100·11	0·1	0·2	96·5
8	Atlin hydromagnesite. Average of eight analyses of pure white material	1·40	0·66	0·22	0·59	41·10	0·90	.....	35·39	.....	.....	18·36	1·38	100·00	1·6	0	94·16
9	California magnesite. Average of sixteen analyses	1·76	0·38	0·36	.....	45·38	0·99	.....	50·63	.....	.....	0·18	.....	99·68	.....	.....	.....

1 to 8. Analyses made in the laboratories of the Department of Mines, Ottawa. Analyses Nos. 1 and 4 by Frederick Baridon; Nos. 2, 6, 7 by A. Sadler; No. 5 by R. A. A. Johnston, Geol. Surv., Can., Ann. Rept., vol. XI, 1898, p. 11R. No. 8 average of eight analyses by N. L. Turner, Geol. Surv., Can., Sum. Rept., 1915, pp. 53 to 55; in these SiO_2 varied from 0·54 to 3·48, total Al_2O_3 Fe_2O_3 FeO from 0·64 to 4·22, and CaO from 0·26 to 2·04.

9. Calculated from results given in Bull. U.S.G.S. 355 by Frank La Hess, Washington, 1908. Silica ranged to 4·7 and 7·7 per cent in two analyses, lime to 5·3 in one, other variations from the given average are not important.

GSC
Ann Rpt 1895
ref Pg 15 & 80.

2. Hübnerite.

This mineral has been met with, in situ, at Emerald, on Tom Murphy's Brook—a small stream about midway between Pine and Coady brooks, and all flowing into Big Brook—about nine miles, by road, from Margaree Forks, Inverness county, in the province of Nova Scotia. It was here found, associated with small quantities of chalcopyrite and a very little pale yellow hydrous mica, irregularly distributed through a mass of light grayish-white, translucent quartz, weighing about a ton and a half, found lying at the outcrop of a lenticular vein of a similar quartz, of some two feet and a half to three feet in width, cutting a gneissic or granitic rock of Pre-Cambrian age. The detached quartz mass afforded, it has been variously estimated, from three hundred to five hundred pounds of dressed material. The vein, however, contained but a comparatively small scattering of the mineral, and that only for about a couple of feet in.

It occurs in the quartz in the form of narrow seams and small irregular masses having a coarsely laminated structure; has a brownish-black colour, a submetallic lustre, breaks with a small subconchoidal fracture and affords a brownish-yellow streak. Mr. R. A. A. Johnston found it to have a specific gravity, at 15·5°C., of 6·975, and, conformably with the results of his analysis—conducted upon carefully selected material—the undermentioned composition :—

Tungsten trioxide	74·28
Molybdenum trioxide	trace.
Manganous oxide	22·73
Ferrous oxide	0·47
Lime	0·02
Magnesia	0·86
Silica	1·33
	99·69

3. Hydromagnesite.

This species, now for the first time identified as occurring in Canada, has been met with in considerable abundance in the immediate vicinity of the 108-mile House on the Cariboo road, ninety-three miles north of Ashcroft, Lillooet district, in the province of British Columbia, where it forms three or four deposits of from fifty to one hundred feet across, standing a foot or more above the level of the surrounding surface, and is also traceable from the one to the other of these deposits over an area of probably fifty or more acres of ground. A shaft sunk on one of these deposits passed through—first, close upon five feet of the pure white material; then, a layer of about six inches of the same of a somewhat yellowish colour; then, another layer of some three feet of the pure white material; then, another layer of

108 Mile House
or
Lac la Hache
WATSON LAKE
92P077-04
PROPERTY FILE
GSS Ann Rpt 1898

about eighteen inches of the yellowish coloured material; then, another, apparently thin, layer of the pure white material; finally reaching, what evidently constitutes the bed of the deposit, a dark coloured mud containing a few more or less well preserved shells. On another of these deposits, a shaft was carried, it is said, to a depth of thirty feet without the bottom being reached.

The material examined consisted of a pure white, more or less firmly compacted, yet readily friable, aggregate of very fine crystalline particles with a few delicate, intermingled rootlets. Its analysis afforded Mr. R. A. A. Johnston the following results:—

Carbon dioxide	37·03
Magnesia	43·71
Lime	0·10
Alumina	0·02
Ferric oxide	0·04
Phosphorus pentoxide	0·30
Silica, soluble	0·38
Water, with a little organic matter	17·79
Insoluble residue	1·53
	100·90

The insoluble residue consisted of:

Silica	1·35
Alumina	0·10
Ferric oxide	0·03
Lime	0·03
Magnesia	0·02
	1·53

The origin of these deposits of hydromagnesite may, it is conjectured, be connected with the occurrence of the later Tertiary volcanic rocks—basalts, et cetera, which, according to Dr. G. M. Dawson, are abundantly represented in the area of country above referred to.

Another series of some three or more deposits of hydromagnesite has more recently been discovered by Mr. J. C. Gwillim some 675 miles north-west of the above-mentioned locality, in a depression running north-west for about a mile back of Atlin City townsite, on the east side of Atlin Lake, in Cassiar district. Of these deposits, one, the largest, has an area of some two acres and a-half, and two have an area of about one acre, whilst the others are less extensive. As in the case of those above described, they present the appearance of raised deposits, their surfaces being two to three feet above the level of the swamp-muck or mud flat in which they lie. Nothing has been done towards ascertaining the thickness of these deposits beyond the sinking, in one instance, of a pit to the depth of five feet just outside the edge of one of the one-acre deposits, and this, as far as it went, passed only through a pure white hydromagnesite. Large exposures of

WATSON LAKE MINFILE: NTS: 92P/11W ELEV:

LAT: LONG:

ALIAS: White EMPRESS.

Several bodies of hydromagnesite with associated areas of impure hydromagnesite are located in a topographic, swampy, depression on the SW side of Watson Lake between Williams Lake & Clinton. (7300 yd²)

AREA A — The larger area covers about ____ hectares with an average depth of the white upper layer is 58cm. Below is a cream to brown colored hydromagnesite.

- Variable depth · up to 2.16 meters (85 inches) 66cm of white earth 1.5 m of cream earth
- Underlain by a dark grey mud.

→ White layer on top 50 to 100cm thick

213 x 61

AreaB — White ~ 1m thick. with fairly pure Hydromag. to depths of 0.94m → 1.53m. with an average of ~ 1.22m of "Pure Material"

⟹ Combined total estimates (Cummings 1940) in order of 22377 tonnes of hydromagnesite with grade in the order of · 41 to 43% MgO · with 4 → 7% Silica + Fe_2O_3 + Al_2O_3

Analyses of WATSON LAKE Samples

	MgO	CaO	CO_2	H_2O	FeO	Fe_2O_3+Al_2O_3	Insol.
#1 3 Cummings P109. Composite of 7 drill holes	39.4	2.1					
#2 (2) Mem 118 Keneck P.31 Sample 7. East dep.							
#3 (1) Mem 118 p31 Sample 8 West dep.							
#4 4 Mem 118 p31 Sample 9. (1 mi NW)							
#5 ~~Mem 118 pg 31 Sample 5 (composite?)~~							

92P077-01