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BRITISH COLUMBIA WAR METALS RESEARCH BOARD
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PROJECT NO. O.D. 6 -- PROGRESS REPORT NO. 1

GISCOMBE RAPIDS CHINA CLAY

Object of Investigation:

To investigate the beneficiation of samples of china clay from Giscombe Rapids, British Columbia.

Description of Samples:

Three samples, submitted by J. H. Cummings, were available for examination. These were as representative of the deposit as was possible to obtain at the time of examination.

The crude clay was cream in colour and somewhat gritty in texture. Analyses were as follows:

	Per Centages				
	Al_2O_3	SiO_2	Fe_2O_3	TiO_2	Comb. H_2O
Sample 1	27.6	58.4	0.94	1.00	9.7
Sample 2	20.9	68.1	1.14	1.17	6.6
Sample 3	26.2	59.6	1.08	1.13	9.4

Summary and Conclusions:

Washing tests were carried out on three samples. Recoveries of washed clay ranged from 57 to 77 per cent, in products assaying 35 to 36.4 Al_2O_3.

It was found impossible, either by flotation or chemical treatment, to produce a sufficiently white product to be acceptable for paper filler. Ceramic tests are being carried on.

Of the sands, approximately 40 per cent was coarser than 100-mesh and assayed about 96 per cent SiO_2, 1 per cent Al_2O_3 and

2 per cent Fe_2O_3 plus TiO_2. Further tests will be made to determine the possibility of reducing impurities to meet specifications for silica sand.

Details of Investigation:

(1) Washing Tests

Samples were blunged and washed in a hydraulic cone, using 1 lb. per ton soda ash and 1 lb. per ton sodium silicate to ensure complete dispersion. Results are tabulated below:

	Recovery Clay %	Per Centages Al_2O_3	SiO_2	Fe_2O_3	TiO_2.	Comb. H_2O
Sample 1	77	36.5	45.6	0.99	1.59	12.9
Sample 2	57	35.0	48.3	1.18	1.63	11.3
Sample 3	77	36.4	45.6	1.49	1.40	12.4

The washed clay was creamy white in colour and of good plasticity.

The sands recovered from the above washing procedure were screened on 65 and 100 mesh, the minus 100 mesh being rejected, and the other fractions analyzed as follows:

		Per Centages Al_2O_3	SiO_2	Fe_2O_3 & TiO_2
Sample 1	plus 65	0.8	96.4	2.3
	minus 65 plus 100	1.0	97.4	1.0
Sample 2	plus 65	0.2	97.7	1.2
	minus 65 plus 100	0.6	97.4	0.9
Sample 3	plus 65	1.1	92.1	4.5
	minus 65 plus 100	1.3	94.3	2.7

To study the sands further, a composite sample composed of equal amounts of Samples 1, 2 and 3 was washed as before and the sands equal to 27.5 per cent of heads, screened with the following results:

	% Wt.	Cum. % Wt.
Plus 20	1.0	1.0
Minus 20 plus 35	3.7	4.7
Minus 35 plus 65	18.8	23.5
Minus 64 plus 100	15.4	38.9
Minus 100 plus 150	15.7	54.6
Minus 150 plus 200	13.0	67.6
Minus 200	32.4	100.0
	100.0	

Of the sands collected, 38.9 per cent was coarser than 100 mesh and equivalent to 10.7 per cent of the weight of the crude clay.

The various fractions coarser than 150 mesh were treated with a hand magnet, and magnetic material recovered. The non-magnetic fractions were assayed with the following results:

	% Mag.	% Al_2O_3	% SiO_2	% Fe_2O_3 + TiO_2
Minus 20 plus 35	2.0	1.5	95.1	2.5
Minus 35 plus 65	0.3	0.5	95.0	2.5
Minus 65 plus 100	0.1	0.7	96.1	1.3
Minus 100 plus 150	0.05	2.0	97.0	1.5

A further study will be made to determine whether iron and titanium can be reduced sufficiently to make the sands suitable for use as silica sand.

(2) Bleaching Tests

The washed clay, although lighter in colour than the original samples, was too dark for use as a paper filler, owing to the presence of organic matter and iron.

A series of tests were made to study the effect of various bleaching agents such as chlorine, acids, etc. Although treatment with chlorine reduces the Fe_2O_3 plus TiO_2 from 2.8 to 1.1 per cent, the colour was still unsatisfactory.

(3) Flotation Tests

A series of flotation tests were run on crude clay to determine whether a pure product could be obtained by this means. Although satisfactory collection was obtained with diamyl amine, di-n-butyl amine, and various long chain amines, there was no material improvement in colour and the floated products were less pure than the obtained by washing.

Tests were also run on washed products to determine whether the organic material could be removed by flotation, but without succes

(4) Ceramic Tests

Several firing tests were made on washed clay at temperatures up to 1300 degrees Centigrade. The clay fired to a fairly

white colour at this temperature with no sign of fusion.

A small sample of washed clay was submitted to the Industrial Minerals Division, Department of Mines and Resources, Ottawa, for a fusion test. It showed a pyrometric cone equivalent to 31 1/2, but the fusion test piece was off-colour after firing.

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