

# MAR 19550005: DOROTHY

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19550005

ECONOMIC MINERALS

FILE REPORT No.

BENTONITE PROSPECTING

GREAT WEST COAL COMPANY LIMITED - DOROTHY DEPOSIT BNT-AE-04

On March 2, 1955 the Department of Mines & Minerals, Province of Alberta granted us, by letter, the right to prospect for Bentonite on the following lands:

Those portions of Section 23, 24, 27, 33 and 34 lying to the north and east of the river, the north-east quarter of Section 26 and all of Section 35, Township 26, Range 17, West of the 4th Meridian.

Those portions of Section 3, 4, 9 and 18 lying to the north and east of the river, the west half of Section 2 and all of Section 10, 14, 15 and 17, Township 27, Range 17, West of the 4th Meridian.

The above lands lie on the east side of the Red Deer River and the Bassano-Rosemary-Nacmine Branch of the Canadian Pacific Railway also lies on the east side of the river and runs through the above lands. Our prospecting permit covers approximately 8,000 acres and covers a larger area than we were interested as the main deposit or that area that could be economically mined crosses the centre of Section 3, the S.W. $\frac{1}{4}$  of Section 10 and a fringe area in S.E. $\frac{1}{4}$  of Section 9. However, as pointed out by the Department that the filing fee was the same for any area up to 20,000 acres, so the larger area was covered until a reconnaissance survey of the area could be made in the spring. This smaller area was confirmed by exploration and area to be tested blocked out. The area, location of test points, were gone over by Mr. Gordon Mathews, Geologist of C.P.R. before final sampling was made and we appreciate his help and experience in this respect.

GEOLOGY AND PROPERTIES

This Bentonitic deposit occurs in the Bearpaw formation (Map reference - Red Deer and Rosebud sheet). Peculiar physical properties of outcrop and exposed beds apparent in deposit by barren, weathered, crinkled coral-like granular appearance when dry, varying in color in exposed seam from cream to grey and varying shades of green. When wetted is exceedingly smooth and soft and feels soapy. Swelling characteristics covered in report on testing, but the deposit can be classified as the swelling sodium type although with low swelling properties.

USES - AS PROSPECTED FOR

1. Pelletizing Taconite.
2. Rotary-drilling Mud.

POSSIBLE SPECIFICATIONS & TEST RESULTS

Pelletizing Taconite:

Bentonite is used as additive to Taconite concentrate to act

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as a bonding agent to reduce the possibility of breakage when the concentrates are rolled into pellets. Compression tests or crushing tests run from 14 to 20 pounds as compared to over 50 pounds for Bell<sup>2</sup> Fouche Bentonite from South Dakota, indicating that it would not be competitive. The introduction into Canada during the past year by International Nickel Company of the new German pelletizing process, that eliminates the binder for pellets, for all practical purposes, removed this large potential market for Bentonite and further work in this respect was abandoned.

In order that our prospecting program be carried out in the most advisable manner, the method was fully discussed with Dr. P.J.S. Byrne, Geologist, Research Council of Alberta and Mr. Gordon Mathews, Geologist, Department of Natural Resources, Canadian Pacific Railway, Calgary. The program and method of sampling as recommended by them was closely followed and I would like to express my appreciation and thanks for their valuable assistance, as they were both familiar with the Dorothy deposit.

Right of entry was obtained from all surface owners and consent to entry agreements were concluded with same on forms provided by our solicitor.

#### PROSPECTING PROCEDURE

As the Bentonitic deposit outcrops along the banks of the Red Deer River at Dorothy and in places forms benches at the foot of the banks, Dr. Byrne advised trenching and test pits and the taking of samples by hand augering, using a coal or 2" auger and boring into freshly exposed main seam. All sampling, both horizontal and vertical was done in the recommended manner and clean and excellent samples were obtained.

In preparing to sample, the undisturbed Bentonite seam was cleaned and trenched to expose the vertical seam in order to obtain as Dr. Byrne suggested undisturbed clay from well back in the seam that would be free from impurities and unaffected by weathering, water conditions, erosion, etc.

Preliminary samples were taken at points numbered 1 to 5 on both sides of the river from typical seam sections to endeavour to locate an area for concentrated evaluation.

Best results were obtained at points 2 and 3 and confirmed previous survey, so area from S.W. $\frac{1}{4}$  of Section 10 across the centre of Section 3 was concentrated on. Seven main points were trenched or pitted and sampled with samples being taken at interminate points where warranted. As sampling progressed, results indicated the desirability of only testing those portions of the seam that indicated bentonite

that might possibly test out, based on color, apparent impurities and sand content as indicated by abrasive qualities.

An average section of the Bentonite formation is as follows:

	<u>Footage</u>	<u>Thickness</u>
Sandstone at base of Edmonton formation	0	
Light greenish - grey shale (Bearpaw formation)	approx. 40'	
Bentonite (not sampled)	43.5'	3.5'
Light green, soft Bentonite	46.5'	3.'
Bentonite similar to above. A few ironstone nodules at bottom.		
2" Sandstone or ironstone band.	49.'	2.5'
Dark green hard Bentonite, probably containing considerable volcanic ash. Much of it breaks in pieces $\frac{1}{2}$ " to 1". Occasional small ironstone nodules. Considerable sand content.		
1" volcanic ash at bottom	53.'	4.'
Dark green Bentonite, softer than above. Occasional $\frac{1}{4}$ " bands of volcanic ash.		
2" to 4" of ash at bottom	56'	3'
Light greenish - grey Bentonite, soft, no visible volcanic ash.	59'	3'
Greenish - grey Bentonite, light green at top. Soft. No visible volcanic ash	62'	3'
Light greenish-grey Bentonite. Soft. No visible ash.	65'	3'
Same as above	68.5'	3.5'
Same as above	69'	<u>.5'</u>
Total thickness Bentonite formation		29.0'
Dark grey shale - two bands 1" thick of light grey volcanic ash top portion	71.5'	

Preliminary tests were run to ascertain the "swelling properties" of the samples, with further test on any sample warranting, if the material indicated had any value as an ingredient for drilling mud.

The following was the recommended preliminary test used:

"to 100cc of distilled water at about 25', contained in standard glass graduate of 100 cc. capacity, were added 2 grams of dried, ground (<sup>1</sup>/<sub>2</sub> - 10 mesh) bentonite samples. The bentonite was added in small portions from the point of a knife blade and each portion of approximately .10 grams was allowed to settle before the next was added. About six minutes elapsed between additions and one hour after the last portion of the 2 gram sample has been added the apparent volume of the bentonite gel in the graduate is read and rechecked after 24 hours. Moderately swelling bentonite will show 20 cc. of gel. A good grade will show from 25 to 30 cc. of gel, and a very high swelling bentonite (good quality) will produce upwards of 30 cc. of gel."

It is important to note that of the large number of tests made the readings mostly ranged from 10 to 16, with one marking 20 cc.'s of gel. Further tests from this section ranged from 16 to 20 and, while the "swelling property" from this area did not represent material of value, to determine the yield and other properties, further tests were obtained to ascertain (1) sand content, (2) percentage of colloidal material, (3) viscosities at different bentonite concentrations, (4) the immediate and 10 minute gel strength of these concentrates, (5) the pH, (6) the wall building properties were determined, (6) the yield of 15 centipose drilling mud per ton was calculated.

The Test results are summarised in the following table and for comparison test results for a sample of good quality Wyoming bentonite currently used for drilling mud is included. (see attached)

The conclusion from the above test is, that the bentonite tested, being the best sample picked out, is far from being suitable for drilling mud. A yield of 15 c.p. mud of 90 barrel per ton is required to be marketable profitably, so that 37 barrels is very low.

#### C.P.R. LANDS

The C.P.R. lands on the west side of the river were tested at several points and, while the depth of the seam is greater, it appears to contain more bands of impurities and test for "swelling properties" were similar indicating low grade.

BENEFICIATING AND ENRICHING - UPGRADING POSSIBILITIES

The enriching of low grade bentonite with chemicals is a possibility. In co-operation with a drilling fluid service company this is being investigated. Samples have been submitted for laboratory experiments, but nothing conclusive has been accomplished to date. It will be several months before reports can be expected as the laboratory is several months behind on its work. However, while it might be possible to chemically enrich bentonite, its economics is quite doubtful. First, the cost in all probability would be excessive and secondly, it would bring a marketing problem as drilling companies would be hesitant to try it unless very favorably priced. Also several major drilling mud distributors in Canada are American miners and processors of bentonite, i.e. Baroid and magcobar.

CONCLUSION

Extensive prospecting and testing of the Dorothy bentonite deposit have shown it to be of low grade and of no commercial value.

I feel we have two alternatives. First, to advise the Department of Mines and Minerals of the Province of Alberta of the results of our prospecting and testing and conclude our permit. Secondly, to apply for bentonite leases on Section 3 and the S.W. $\frac{1}{4}$  of Section 10, all in Township 27, Range 17, West of the 4th Meridian and continue the experiments for enriching mentioned above.

EXPENDITURES

The sum of \$1563.84 was actually cash expenditures in respect to bentonite prospecting and testing. This amount does not include any cost for salary personnel used in this work, nor charges for car, truck or any company equipment used. There will likely be additional laboratory accounts come in for testing and analysis.

Enclosed please find a map of the area showing area tested and test points located on same.

Respectfully submitted,



R.L. WOOD

Test results on Bentonite submitted from Red Deer  
River Valley in the Dorothy Area

Sample	Sand Content	Colloidally Suspended Material (% by Wt.)	% by Weight of Bentonite in Suspension	Viscosity in Centipoises	Initial gel Strength	10 minute gel Strength	pH	Wall Building Properties		Yield of 15 cp mud in barrels per ton of Bentonite
								Filtrate (in cc)	Cake Thickness	
No. 3	.02	64.8	10	4.0	2.0 gm.	3.5 gm.	7.3	13.5	3/64 inch	37.1
			12	6.5	2.5 gm.	3.5 gm.		12.0	3/64 inch	
			14	14.5	2.5 gm.	4.5 gm.		11.5	4/64 inch	
			16	34.0	3.5 gm.	6.5 gm.		10.5	5/64 inch	
Wyoming Bentonite	2.2	91.5	3	4.0	2 gm.	2 gm.	9.5	17.5	2/32 inch	104
			4	9.5	2 gm.	10 gm.		15.0	2/32 inch	
			5	23.0	3 gm.	22 gm.		12.5	3/32 inch	
			6	51.5	9 gm.	50		11.0	3/32 inch	