Bentonite Deposits of the BIGHORN BASIN

by
Kenneth Pedersen
August, 1968

Introduction: The purpose of this investigation was to describe and sample economically important bentonite beds in the Bighorn Basin. Field work was carried out between August 5 through 10 and was greatly facilitated by the cooperation of the personnel of American Colloid Company in Lovell and Magnet Cove Bentonite in Greybull. Samples were mostly taken at open pits where mining was in progress or at locations which were mined in the past. Other samples were collected at localities which may be economically important in the future.

The economics of bentonite production is constantly changing. The technical advancements within the past ten years have increased the efficiency of mining operations to such an extent that deposits with an overburden ratio of ten to fifteen to one are now economically exploitable. Other factors considered in evaluating bentonite deposits are the hauling distance, thickness of the deposits and the dip angle of the beds.

Description of the deposits:

Cody, Wyoming: A bentonite seam 2-6 feet thick occurs within the Frontier formation about 200 yards east of U.S. Highway 120, north of Cody in sec. 11, T. 53 N., R. 102 W. The bentonite occurs as seams between siliceous shales and siltstones. There are at least four bentonite seams in the immediate area, but only

one appears to be exploitable. Sample numbers Cody A through Cody C were taken at this locality.

The thickest bentonite bed ranges from 2 to 6 feet thick and dips to the northeast at an angle of 28 to 30 degrees. The bentonite is capped and underlain by hard layers of siliceous shale and the bentonite layer pinches and swells laterally. The overburden increases rapidly eastward due to the large dip angle.

Dry Creek: A $7\frac{1}{2}$ foot bed of bentonite occurs 100 feet below the Mowry in the Thermopolis formation. The seam dips to the southwest at 10 degrees and there is almost no overburden on a dip slope. The deposit is found in sec. 25, T. 58 N., R. 96 W. about 8 miles east of Frannie.

Lovell: The bentonite beds examined at Lovell are currently being strip mined by the American Colloid Company. They range in grade from foundry grade to drilling mud quality. They are located in sec. 30, T. 57 N., R. 94 W. and sec. 24, T. 57 N., R. 95 W.

The lower seam occurs near the top of the Thermopolis shale and dips 10 to 12 degrees southwest. The seam is 3 to 4 feet thick and up to 35 feet of overburden is being removed. One hundred feet above the Mowry-Thermopolis contact is a seam of bentonite about 6 feet thick which dips to the southwest

at 5 degrees. Ten feet of overburden occurs at the mine where the seam is exposed.

Approximately 180 feet above the Mowry-Thermopolis contact is another seam of bentonite which averages 4 feet in thickness. The seam dips 5 degrees to the southwest and about 5 feet of overburden is being removed.

Another seam of bentonite which is being prepared for mining occurs about 150 feet above the Mowry-Frontier contact. The seam averages 6 feet in thickness and dips 5 degrees to the southwest. From 4 to 10 feet of overburden is being removed.

Greybull: The Magnet Cove Barium Corporation is mining three major horizons of bentonite northeast of Greybull. The lowest seam occurs at the contact of the Mowry and Frontier formations. It ranges from 4 to 7 feet thick and dips about 4 degrees. The average overburden ratio for mining this bed is 4 to 1. This horizon is the "Clay-spur" equivalent. Another seam occurs 100 feet above the base of the Frontier. The seam averages 4 to 5 feet thick and has an average dip of 4 degrees. The overburden ratio is 4 to 1. This bentonite changes character with increasing overburden.

The third bentonite horizon being mined occurs about 250 feet below the base of the Cody shale. The seam averages two feet

thick and dips 4 degrees. The overburden ratio is 10 to 1.

Tensleep: Only two beds of bentonite were examined near Tensleep. One bed is 100 feet above the Mowry-Frontier contact and averages 2 feet in thickness. It dips 20 degrees to the southwest and does not appear to be economically important at the present time.

Another bed occurs near the top of the Mowry, but it is not the "Clay-spur" equivalent. This bed is about three feet thick and also dips at 20 degrees to the southwest. The rapid increase in overburden is the major economic consideration in mind when evaluating the potential of this horizon, which does not seem to be economically feasible at present.

Other data concerning the bentonites of the Bighorn Basin will be forwarded to the Geological Survey of Wyoming when they are compiled by the Bureau of Land Management.

MR68-2

August 13, 1968

Memorandum to: Mr. Walter Duncan
Associate Director
N.R.R.I.

From: Kenneth Pedersen, Geologist
Geological Survey of Wyoming

Re: Geographic locations for the Madison limestone and bentonite samples from the Bighorn Basin area.

Limestone Sample No.	Location	Comments
A-1	Upper 50 ft. sec. 32, T.49N., R.83W.	Probably from about 100'± below Madison-Amsden contact.
A-2	sec. 32, T.49N., R. 83W.	25 foot bed below sample A-1.
A-3	sec. 32, T.49N., R. 83W.	30 foot bed about 20 ft. below A-2.
A-4	sec. 32, T.49N., R. 83W.	20 foot bed about 25 ft. below A-3.
B-1	sec. 16, T.56N., R. 87W. along U.S. Highway 14.	110± ft. above Darby-Madison contact - 20 to 30 foot interval.
B-2	sec. 16, 21, T.56N., R.87W. Along U.S. Highway 14.	25 foot interval starting 75 feet above B-1.
C-1	sec. 20, T.55N., R. 86W. Along Soldier Creek Canyon.	20 foot interval near the middle of Madison section (about 450'± from base).

C-2	sec. 20, T.55N., R. 86W. Along Soldier Creek Canyon.	30 foot interval about 200 feet above C-1
D-1	NW¼, sec. 35, T.53N. R.83W.	25 foot interval near middle (?) of section.
SP-1	sec. 32, T.31N., R. 100W.	100 feet below top of Madison - 10-15 foot bed.
SP-2	sec. 29, T.31N., R. 100W.	Lower part of cliff - may be the top beds in Bighorn fm. (?)

Bentonite Sample No.	Location	Comments
Cody A	sec. 11, T.53N., R. 102W.	5 to 6 foot bed about 100 feet below top of Frontier fm.
Cody B	sec. 11, T.53N., R. 102W.	200 yds. north of Cody A.
Cody C	sec. 11, T.53N., R. 102W.	Sporadic intervals between A and B.
Greybull A	NE¼, sec. 21, T.53N. R.92W.	4½ to 5 foot bed "Clay Spur" at top of Mowry.
Greybull B	SW¼, sec. 2, T.53N. R.93W.	4 to 5 foot bed 100 feet above A in Frontier fm.
Greybull C	SE¼, sec. 34, T.54N. R.93W.	4 foot interval - same bed as B - variance due to heavy overburden.
Greybull D	NW¼, sec. 12, T.53N. R. 93W.	250 feet below Frontier-Cody shale contact. Two foot bed with 20 feet of overburden being stripped.

Lovell A	NW¼, sec. 30, T.57N. R.94W.	3-4 foot bed near top of Thermopolis.
Lovell B	NW¼, sec. 30, T.57N. R.94W.	6 foot bed 100 feet above Mowry-Thermopolis contact.
Lovell C	NW¼, sec. 30, T.57N. R.94W.	4 foot bed 80 feet above B.
Lovell D	SW¼, sec 24, T.57N. R.95W.	6 foot bed 150't above Mowry-Frontier contact.
Dry Creek	SW¼, sec. 25, T.58N. R.96W.	Sample thru 3 foot interval and on dip slppe 100' below top of Thermopolis.
Worland A	sec. 6, T.46N., R.90W.	2 foot bed 100 feet above Mowry-Frontier contact.
Worland B	sec. 6, T. 46N., R.90W.	3 foot bed near top of Mowry- not "Clay-spur" equivalent.

I hope the samples are sufficient for your needs. Thank you for your cooperation.

Sincerely,

Kenneth Pedersen

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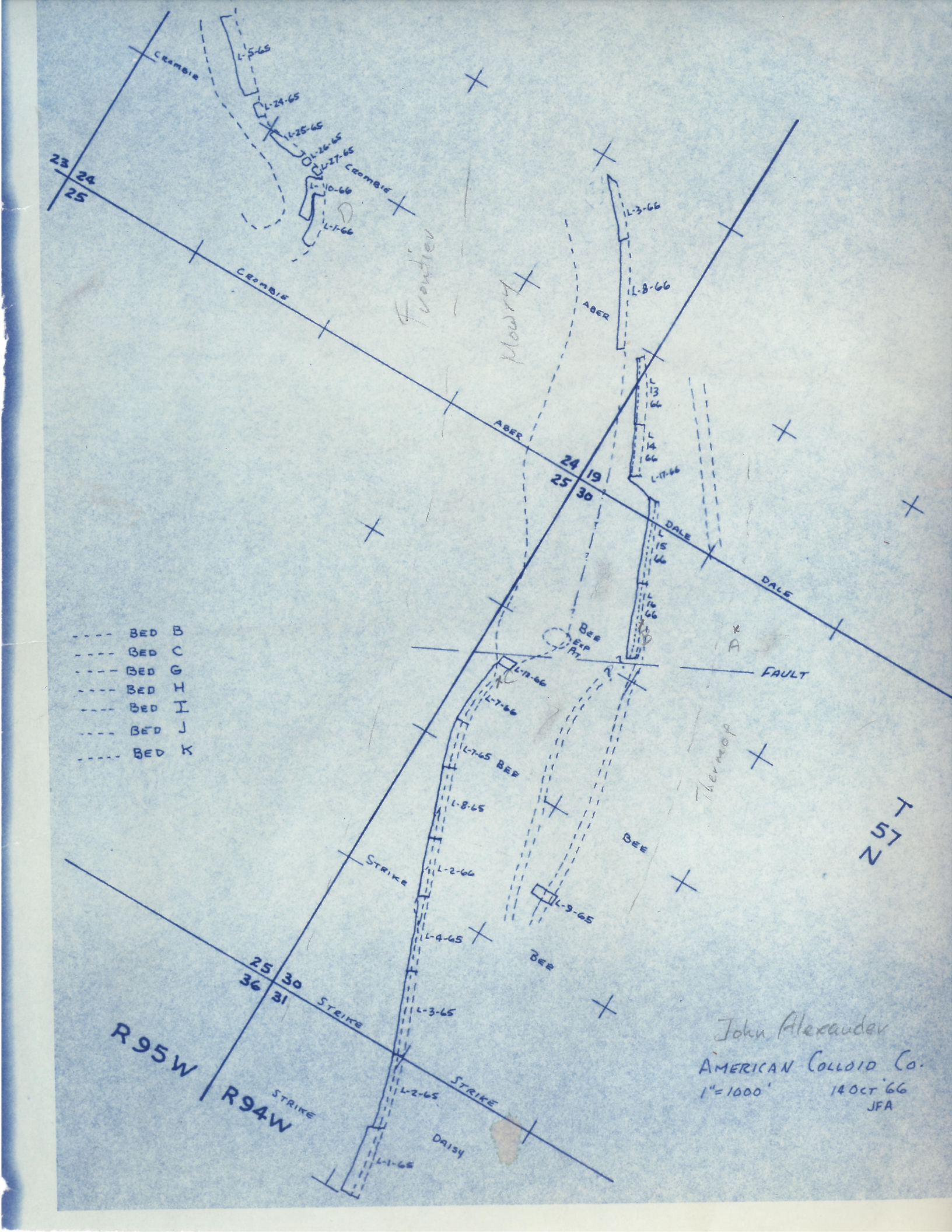
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Frontier
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L-3-66
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L 13 66
L 14 66
L-17-66
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L-4-65
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STRIKE
L-2-65
STRIKE
DAISY
L-1-66
John Alexander
AMERICAN COLLOID CO.
1"=1000'
14 OCT '66
JFA