North Dakota Geological Survey
100K Series: Elgn - al

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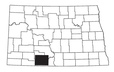
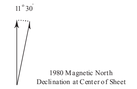
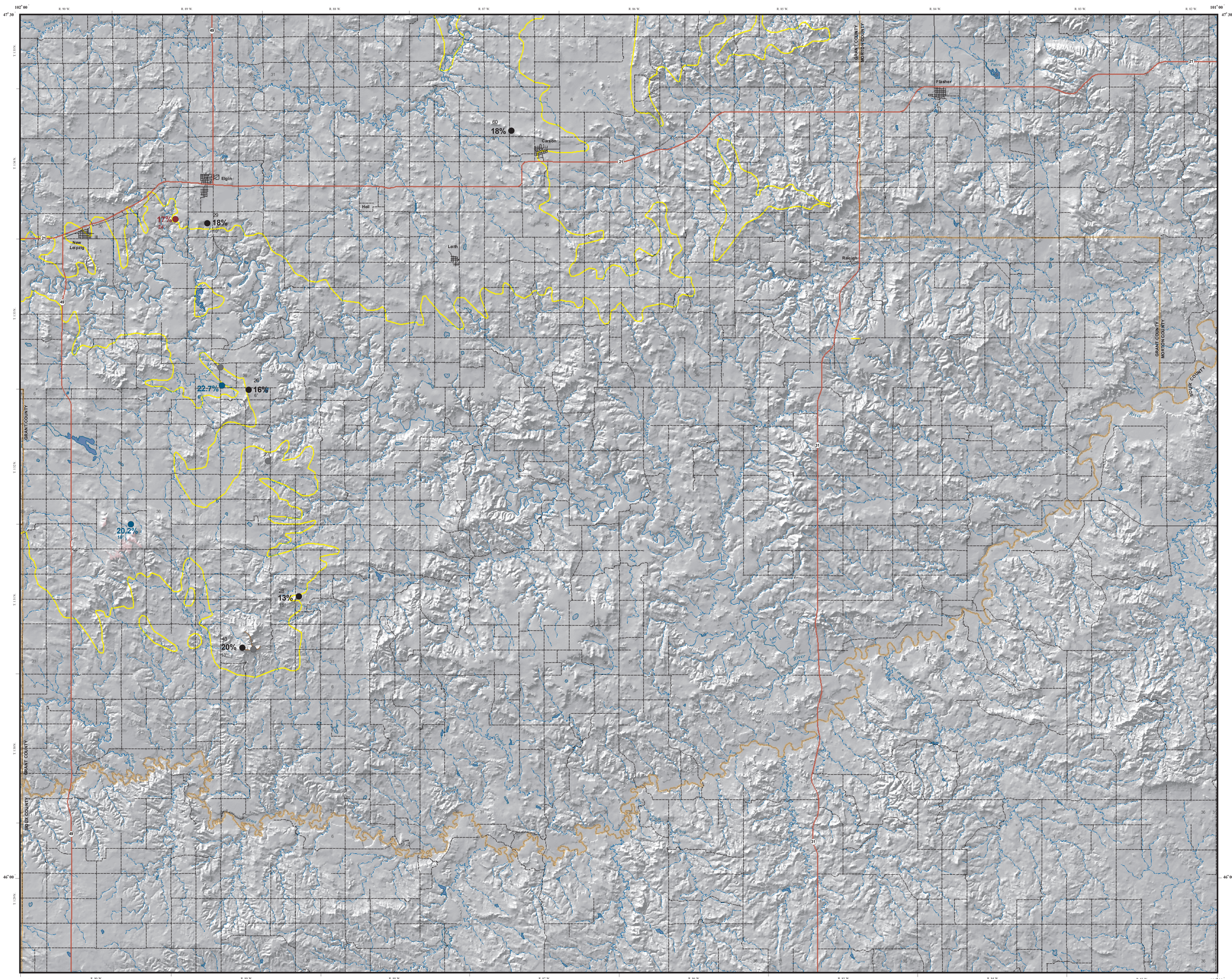
Alumina Content of Paleocene Claystones

Elgin 100K Sheet, North Dakota







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Only a handful of studies have published the alumina (Al_2O_3) contents of claystones in western North Dakota: Clarke (1948), Hansen (1959), Chew and Boyd (1960), Prichard (1980), and Murphy (2012). Clarke (1948) collected 417 samples primarily from the Chalky Buttes in Slope County and the Little Badlands in Stark County. All but eight of his samples were from bentonites (primarily the South Heart Member of the Chadron Formation). Clarke's sample localities were not plotted on any of the map sheets because the current project is focused on the alumina content of kaolin deposits.

Hansen (1959) collected 125 claystone samples from 44 sites in the Bear Den Member of the Golden Valley Formation and in the Sentinel Butte and Bullion Creek Formations. The one sample site that plots on this map is the average of three sample analyses and appears to have been collected from the Rhame Bed. The placement of Hansen's sample sites is not exact because the locations were only listed down to the section (square mile). Hansen used the legal description as his sample number.

Chew and Boyd (1960) reported alumina values for 52 sample sites in western North Dakota. They plotted the sample locations on county maps published by the ND Highway Department at one inch to the mile. Chew and Boyd analyzed two samples from this map sheet.

The North Dakota Geological Survey collected 232 samples from 62 localities in western North Dakota in 2011 and 2012. The initial results were published in NDGS Geologic Investigations no. 158 and the full report will be published in NDGS Report of Investigations no. 112. Multiple samples were collected from all but the most limited outcrops. The NDGS alumina values plotted on this map represent an average of four analyses (range from 2 to 5) per site. Only sample 55 represents a single analysis. The alumina value is a weighted percent (the sum of individual analyses were multiplied by individual bed thickness and then divided by the thickness of the entire kaolin layer). The reported alumina values for site 43 are for the Bear Den Member.

REFERENCES

Chew, R.T. III, and Boyd, G.A., 1960, A preliminary investigation of clay deposits in Minnesota, North Dakota, Montana, Northern Idaho, and Washington; Northern Pacific Railroad Company, Properties and Industrial Development Department, 161 p.

Clarke, F.F., 1948, Southwestern North Dakota clay deposits Stark, Slope, and Billings counties, N.Dak.: U.S. Bureau of Mines Report of Investigations 3219, 32 p.

Clayton, Lee, 1980, Geologic Map of North Dakota: United States Geological Survey, 1:500,000 scale.

Hansen, Miller, 1959, Clays of North Dakota as a potential source of alumina; North Dakota Geological Survey Report of Investigation no. 33, 15 p.

Murphy, E.C., 2012, Alumina content of the Bear Den Member and the Rhame Bed in North Dakota; North Dakota Geological Survey Geological Investigations no. 158.

Prichard, G.H., 1980, Authigenic kaolinite in the Bear Den Member (Paleocene) of the Golden Valley Formation in southwestern North Dakota, unpublished Master's Thesis, University of North Dakota, 174 p.

EXPLANATION

23 **Sample or Site I.D.**

16% **Alumina Percent**

6' **Bed Thickness (underlined if it is the entire bed)**

Hansen (1959)

Chew and Boyd (1960)

Murphy (2012)

Sample not analyzed

WHITE RIVER and ARIKAREE Strata (Eocene through Miocene)

The White River and Arikaree rocks were plotted on this map because they may contain various concentrations of erionite. Erionite is a fibrous zeolite that has been identified by the World Health Organization as a Group 1 carcinogen. Any proposed mining of the Bear Den in the vicinity of White River or Arikaree rocks will require the overburden be tested for erionite and could, depending upon results, curtail mining in the area.

GOLDEN VALLEY FORMATION (Paleocene and Eocene)

The Bear Den Member is generally at the surface along the outer edges (contact between the Golden Valley and Sentinel Butte Formations) of the deposit.

RHAME BED (Paleocene)

The top of the Rhame Bed marks the contact between the Slope Formation and the overlying Bullion Creek Formation. This contact was mapped by Clayton (1980) at a scale of 1:500,000.

Geology Undifferentiated

Other Features

- Water
- Water - Intermittent
- River/Stream - Perennial
- River/Stream - Intermittent
- Section Corners
- County Boundary
- State Highway
- Paved Road
- Unpaved Road

Scale 1:100,000

0 1 2 3 4

Miles

Mercator Projection 1927 North American Datum
Standard parallel 46°00 Central meridian 101°30
USGS NED Shaded Relief - Vertical Exaggeration 9x

Note: This map was expanded beyond the normal Elgin 100K Sheet to include an additional height of four miles south to the South Dakota border.

Cartographic Compilation: E. L. Kadrmas