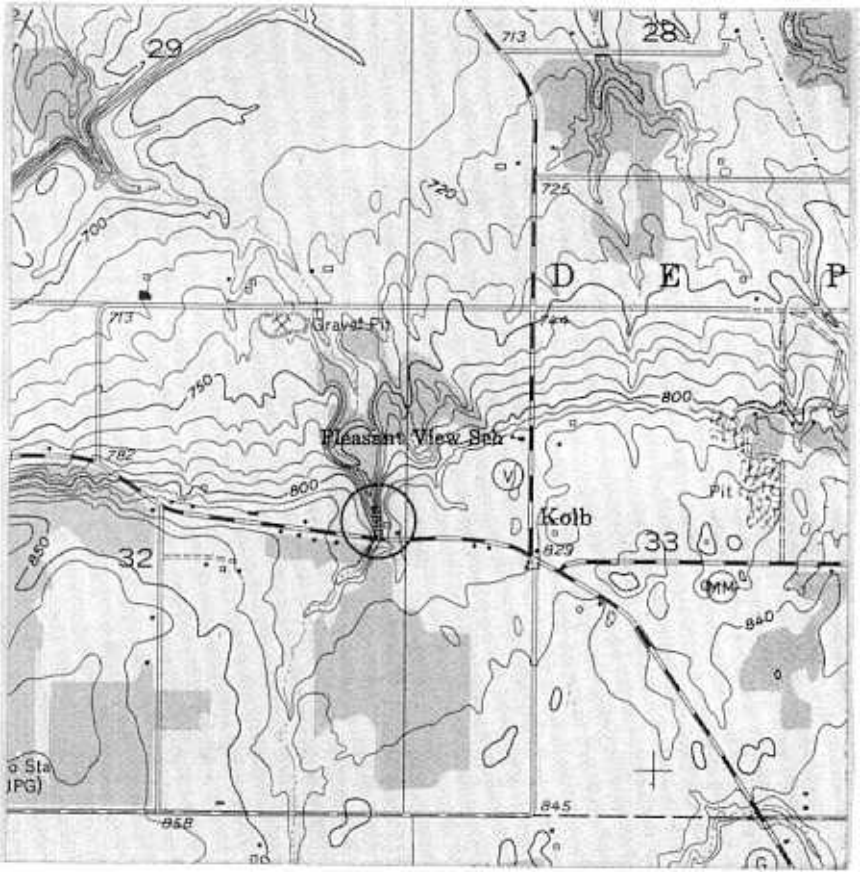
Title: Kittell Falls

Location: Natural falls at the north side of County Highway "G" and 0.4 miles west of junction with County Highway "V", "MM", and "G" in the SE¼, NE¼, Sec. 32, T.23N., R.21E., Brown County (Bellevue 7.5-minute topographic quadrangle, 1970).




Author: M. E. Ostrom (modified from Rosenzweig, 1951)

Description: Exposure of Maquoketa Shale, Neda "Iron Ore" Formation, and Silurian dolomite.

Very little data is available on the distribution of the Neda Formation in this area. It is considered to be discontinuous and to occur in lenses. It was at one time mined near Iron Ridge in Dodge County where it is over 50 feet thick in places. Its high phosphorous content makes it undesirable for mining today. None of the wells around the outcrop shows any ore. An outcrop 1½ miles east also fails to show any ore. It is therefore assumed that the lense is of small extent.

A shallow channel sample was taken and analyzed by Inland Steel, with the following results:

| Iron | P | Si | Mn | Al | S | CaO | MgO | Loss |
|---|---|---|---|---|---|---|---|---|
| 21.68 | .880 | 17.00 | .11 | 5.86 | .988 | 10.65 | 5.44 | 17.00 |

There are two main hypothesis concerning the origin of the ore:

(1) One theory holds that carbonate sediments were replaced long after deposition by iron oxides. Apparently there is not enough supporting evidence for this theory.

(2) A second theory, advanced by Hawley and Bevan (1934), postulates that the iron was deposited from a colloidal state as ferric hydroxide and hydrated aluminosilicates and the iron compound was later partially dehydrated. Description follows:

SILURIAN SYSTEM

Mayville Dolomite (+30.0')

| | | |
|---|---|---|
| 37.9' | 23.0' | Dolomite and dolomitic limestone, light yellowish gray, thin-to-medium to fine-crystalline, medium-bedded (1" to 18"). Some chert in lower part. Based contact even and sharp. |
| 13.4' - 14.9' | 1.5' | Dolomite, green gray, finely crystalline, dense. Lenticular with undulating base. |
| 13.4' | 0.1' | Shale, ferroginous, variegated |

ORDOVICIAN SYSTEM

Neda Formation (5.3')

| | | |
|---|---|---|
| 13.3' | 1.2' | Dolomite, blue green, very finely-crystalline, with abundant pyrite. Some oolites, especially in lower part. |
| 12.1' | 2.5' | Iron ore, oolitic, dark reddish brown. Oolites are flattened parallel to bedding. Clay pebbles up to 2 inches in diameter are present. Shale partings present and most abundant in lower part. |
| 9.4' 9.6' | 0.2' | Shale, dark bluish gray, calcareous. |
| 8.0' 9.4' | 1.4' | Shale, brown, abundant oolites along bedding planes. Oolites increase upward. Some shiny 2-inch pebbles of shale and large oolite structures. Fossils were collected 1.5 feet above base by Savage and Ross ( ). Abundant pyrite near top. |

ORDOVICIAN SYSTEM

Maquoketa Shale (8.0')

| | | |
|---|---|---|
| 8.0' | 8.0' | Shale, gray green, calcareous, hard, thinly-laminated in beds 3 inches to 8 inches thick with "yeast-like" fracture. |

BASE OF EXPOSURE

Significance: Exposure illustrates lithology and constant relationships of the Maquoketa, Neda, and Mayville Formations and, in the Neda, an ore of iron referred to as "flax-seed".

How is the Neda related to the Maquoketa? Contact? Lithology? Minerology? Fossils? Bedding at sedimentary structures? How is the Neda related to the Mayville? Explain the flattened oolites. What was the environment of deposition of each of the formations and what is your evidence?

References: Savage and Ross, 1916; Hawley and Bevan, 1934; Rosenzweig, 1951.