Outcrop-to-Subsurface Stratigraphic Correlations of the Upper Desmoinesian and Lower Missourian Stages (Pennsylvanian) in Eastern Kansas

Regional Assessment of Group Boundaries from Type, Principal, and Neostratotype Sections

Supplemental File 2

Type Section Evaluations

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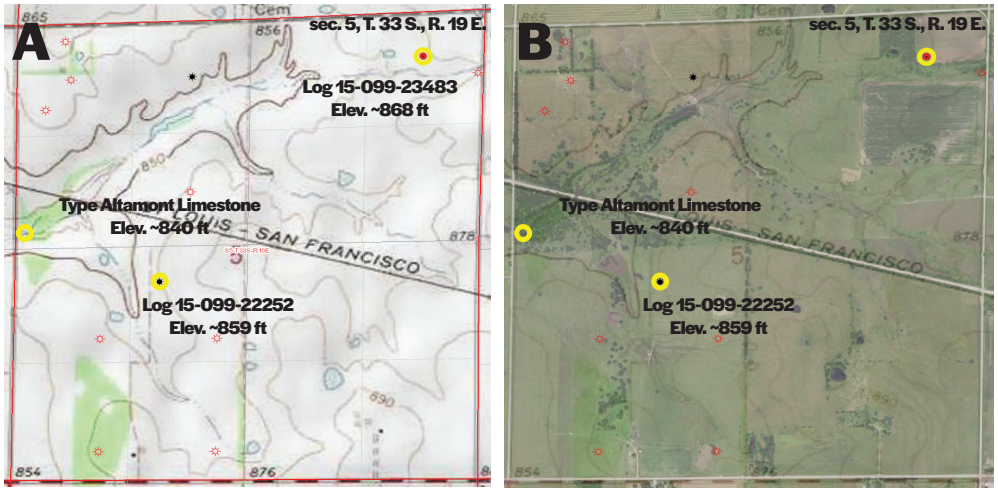
Kansas Geological Survey
Lawrence, Kansas 66047
2025

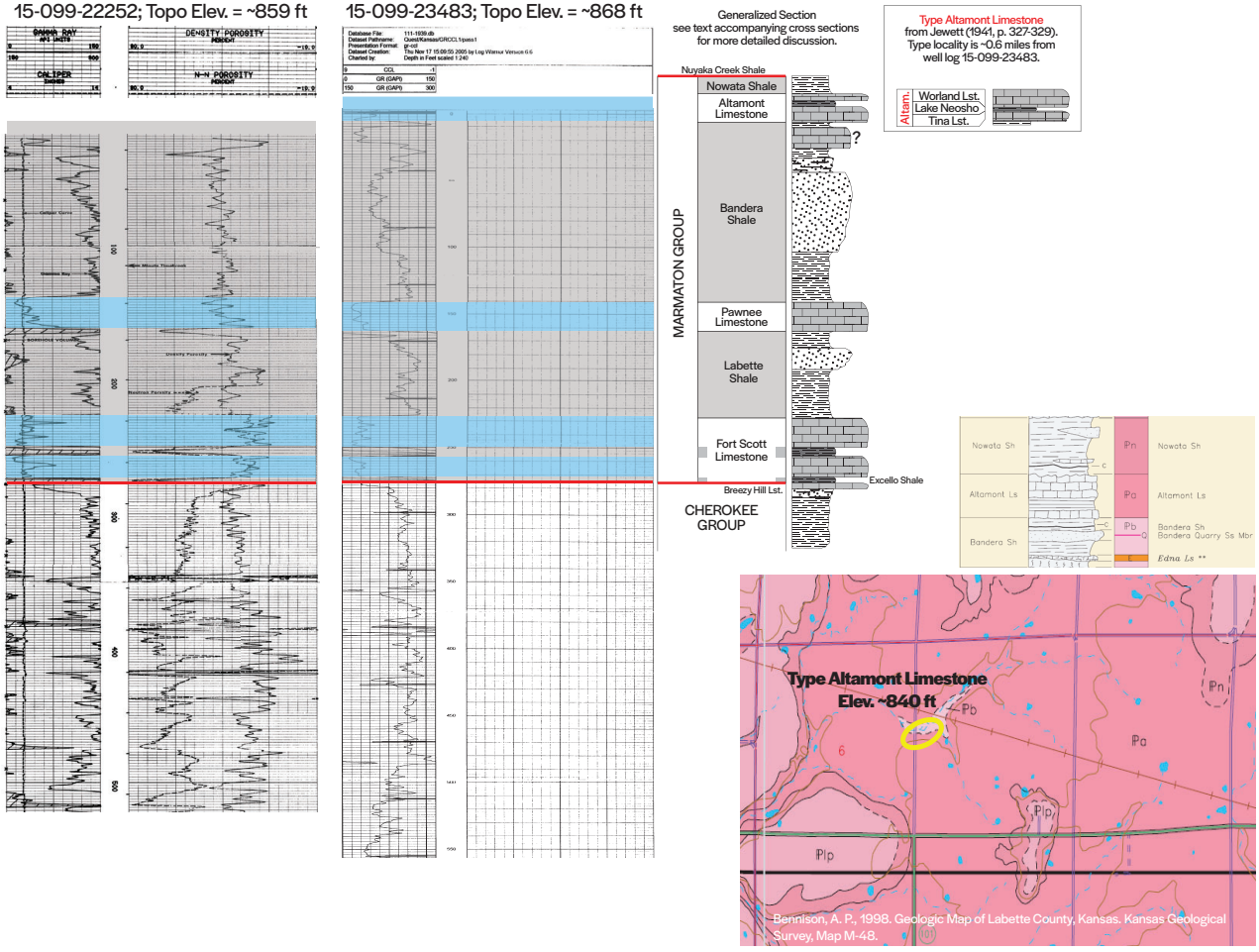
KANSAS GEOLOGICAL SURVEY
The University of Kansas

Type Altamont Limestone (Jewett, 1941)

TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA



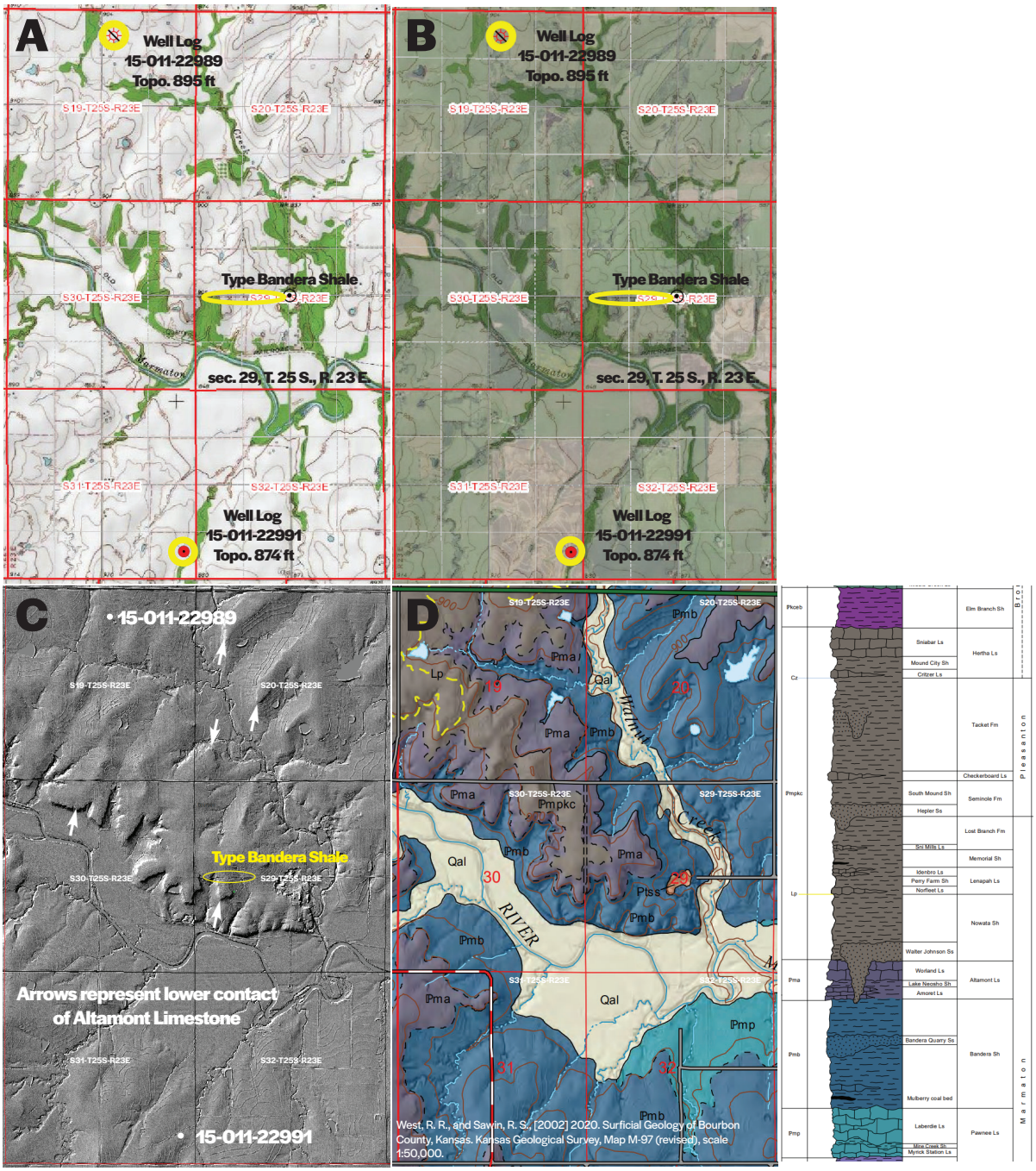
Aerial view of sec. 5, T. 33 S., R. 19 E. in Labette County, Kansas. The Type Altamont Limestone (Jewett, 1941, p. 327–329) is located at center of west line of sec. 5, T. 33 S., R. 19 E. in Labette County, Kansas. The exact position of the type section is documented in the Kansas Geological Survey's outcrop binder of Labette County, Kansas. For additional information see Jewett (1945, p. 38). A) Topographic map uses 10 ft (about 3 m) contouring. B) Aerial photograph with topographic overlay. Each image represents 1 sq mile (1.61 sq km).



Mapping units in the area surrounding the type Altamont Limestone. Each blue box outline in image represents 1 sq mile (1.61 sq km).

Type Bandera Shale (Jewett, 1941)

TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA

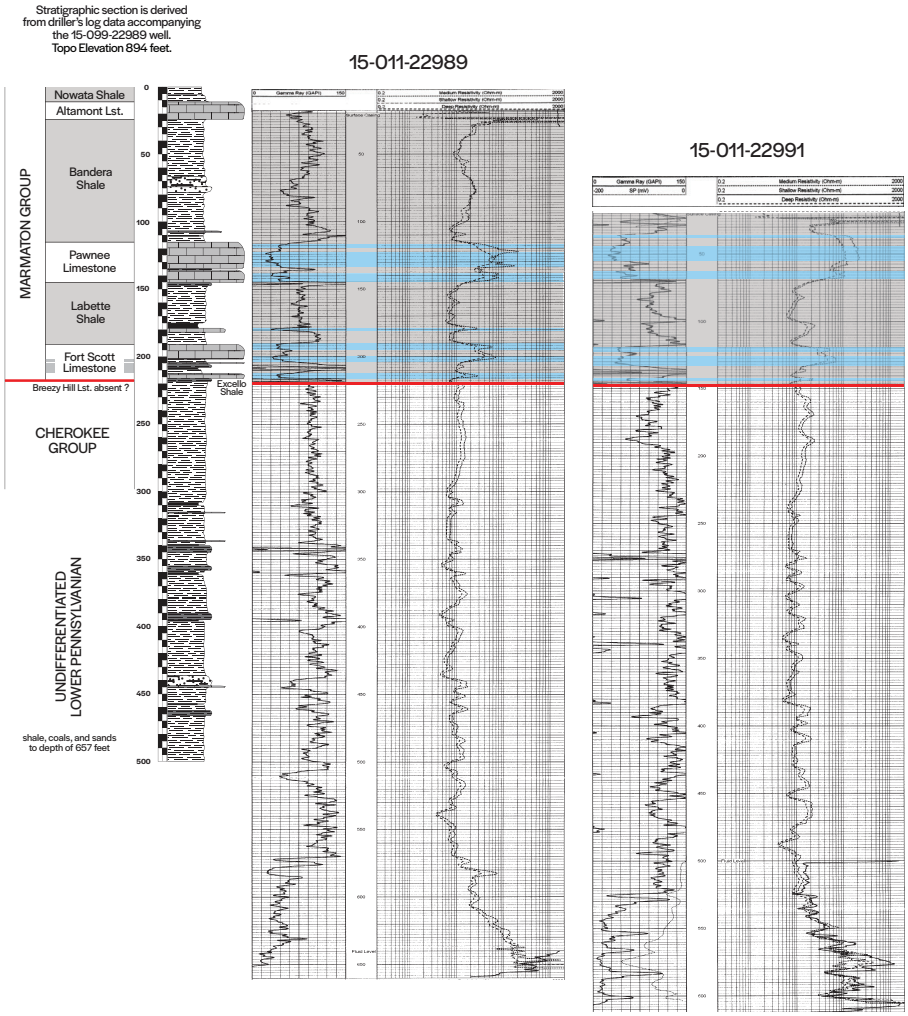


Aerial views of sec. 29, T. 25 S., R. 23 E. and surrounding area in Bourbon County, Kansas. The Type Bandera Shale (Jewett, 1941, p. 321–323) is located near the center of the north line SW 1/4 sec. 29, T. 25 S., R. 23 E. and within the Bandera quarry at the center of that same section. There are no documented outcrops of this unit in its entirety. A) Topographic map uses 10 ft (about 3 m) contouring. B) Aerial photograph with topographic contouring. C) LiDAR image of type locality and surrounding area. D) Mapping units in the area surrounding the type locality. Each box outline (e.g., red box in panels A and B) in images represents 1 sq mile (1.61 sq km).

Type Bandera Shale (Jewett, 1941)

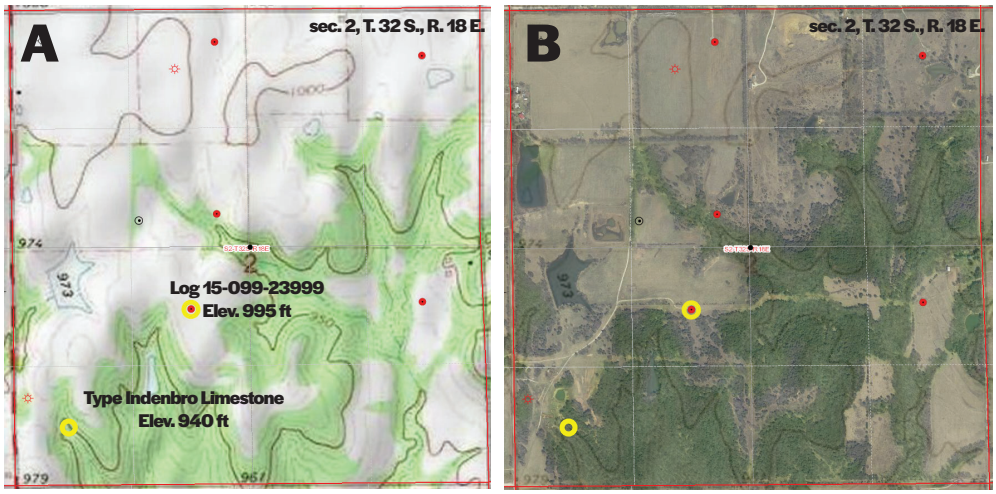
TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA

Observation: Our assessment via geophysical and driller's log data demonstrates that the Altamont Limestone is approximately 10 feet (about 3 m) beneath the surface at well 15-011-22989. This agrees with geological mapping in Bourbon County by West and Sawin (2002). Furthermore, outcrop tracing via LiDAR does indicate that the Altamont Limestone crops out along the ridgeline above the type section of the Bandera Shale. Therefore, we conclude the Bandera Shale is at the correct stratigraphic position between the Pawnee Limestone and Altamont Limestone formations.

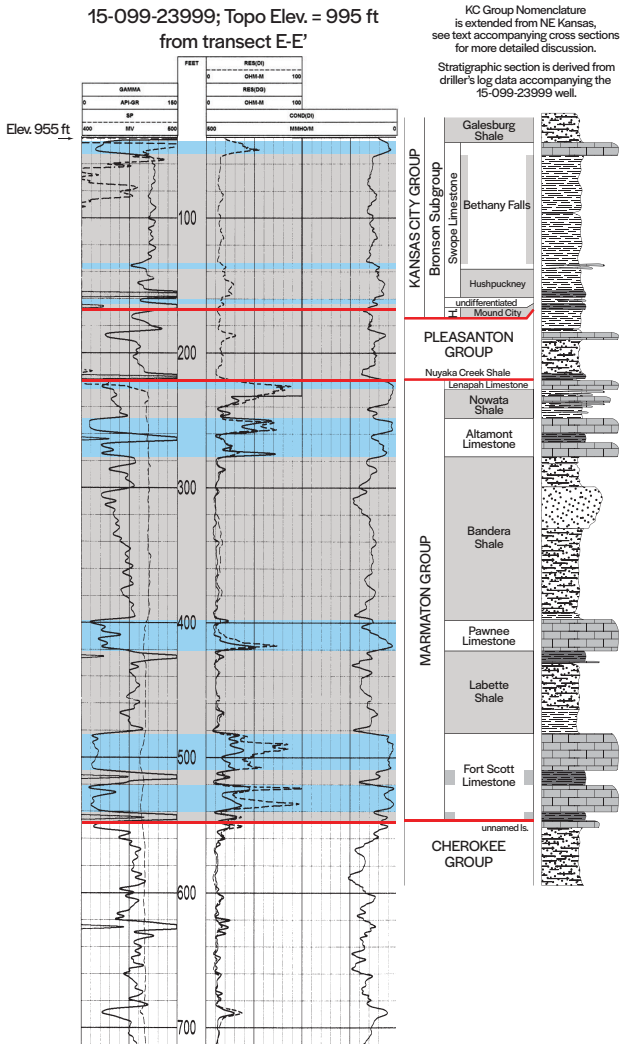


Type Idenbro Limestone Member (Jewett, 1941)

TYPE LOCALITY IS IN CONFLICT WITH REGIONAL DATA



Aerial view of sec. 2, T. 32 S., R. 18 E. in Labette County, Kansas. The type section of the Idenbro Limestone (Jewett, 1941; p. 340) is located at SW sec. 2, T. 32 S., R. 18 E. For additional information, see Jewett (1945, p. 47). A) Topographic map uses 10 ft (about 3 m) contouring. B) Aerial photograph with topographic overlay. Each image represents 1 sq mile (1.61 sq km).



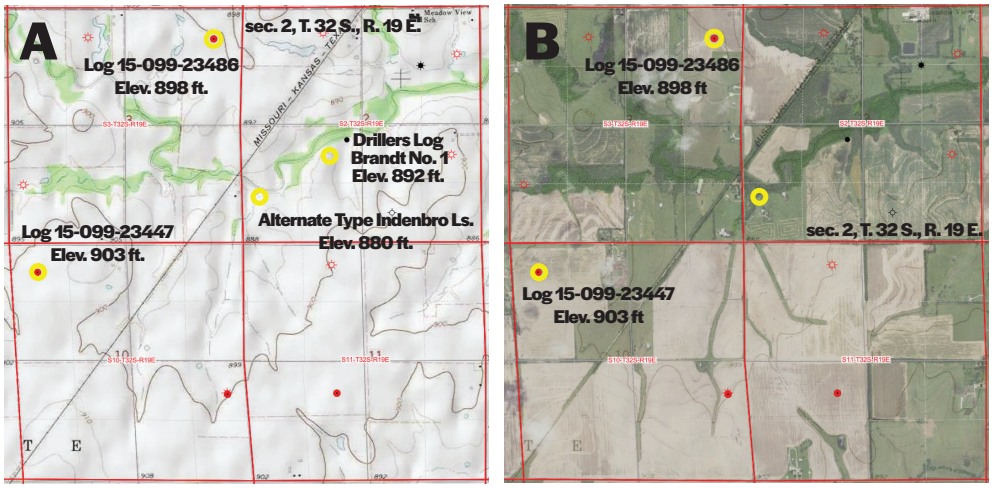
Observations: The type section of the Idenbro Limestone of the Lenapah Limestone is at a stratigraphic position well above the Mound City and Hushpuckney shale units as correlated in our cross sections. See cross section E (Supplemental File 4) for further details.

The uppermost red line on the geophysical log to the left at about 167 feet (51 m) in depth represents the disconformity at the top of the Pleasanton Group (i.e., base of Mound City Shale). In other parts of the study area, this boundary is located at the base of the Critzer Limestone. The Critzer Limestone is, however, absent in many locations, and in its absence, we place the boundary at the lower contact of the black fissile facies of the Mound City Shale. The Idenbro Limestone type section correlates to the upper Bethany Falls of northeastern Kansas.

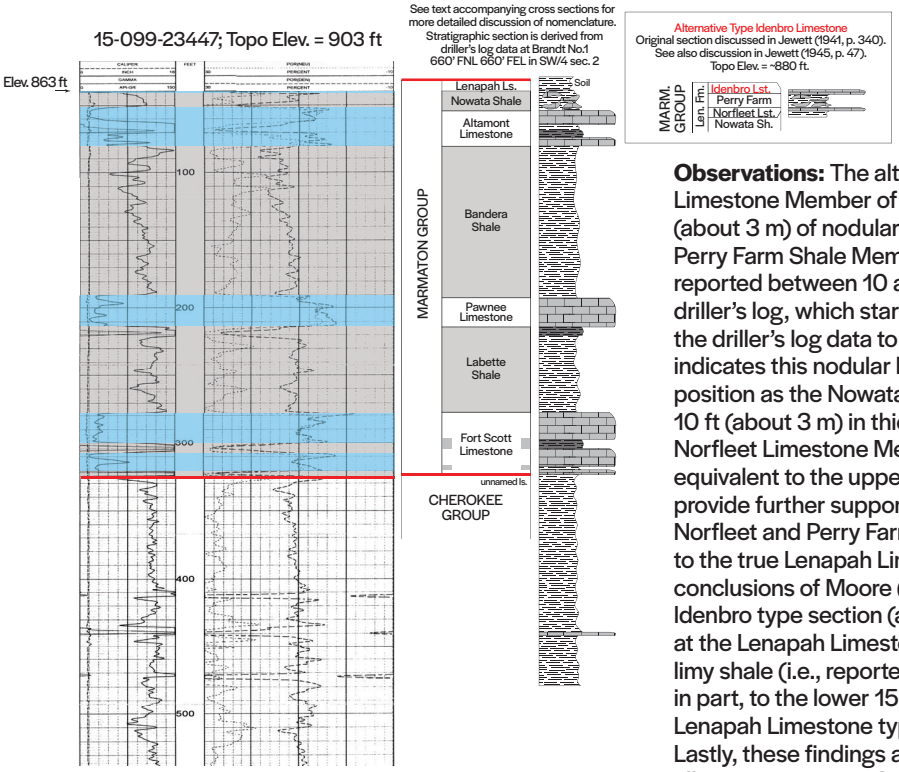
Alternate Type Idenbro Limestone Member (Jewett, 1941)

TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA

SOME NOMENCLATURAL IMPLICATIONS

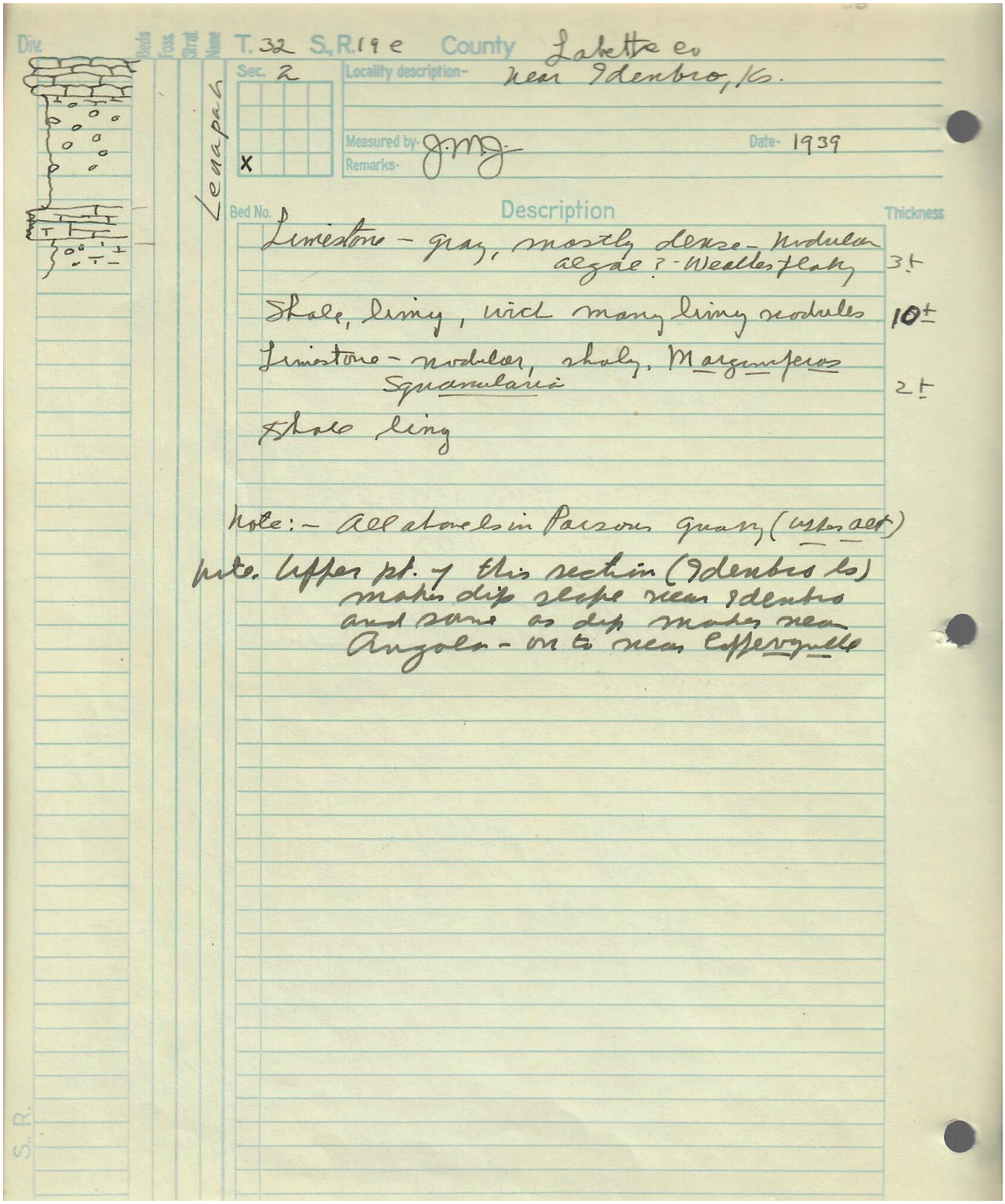


Aerial view of sec. 2, T. 32 S., R. 19 E. in Labette County, Kansas. The alternative type section of the Idenbro Limestone Member (see Greenberg, 1986) is located at SW SW sec. 2, T. 32 S., R. 19 E. The exact position of the type section is documented in the Kansas Geological Survey's outcrop volume of Labette County, Kansas (see description made by Jewett in 1939; original document is contained within the Labette County outcrop binder stored at the KGS). A) Topographic map uses 10 ft (about 3 m) contouring. B) Aerial photograph with topographic overlay. Each image represents 1 sq mile (1.61 sq km).



Observations: The alternative section for the type Idenbro Limestone Member of the Lenapah Limestone contains 10 ft (about 3 m) of nodular limy shale in its middle part (i.e., Perry Farm Shale Member). This nodular shale is similarly reported between 10 and 25 ft (3–7.6 m) in the Brandt No. 1 driller's log, which starts at higher elevation. Comparison of the driller's log data to petrophysical log 15-099-23447 indicates this nodular limy shale is at the same stratigraphic position as the Nowata Shale, which has thinned to about 10 ft (about 3 m) in thickness at this location. With this, the Norfleet Limestone Member is at a stratigraphic position equivalent to the upper Altamont Limestone. These data provide further support for type section analyses of the Norfleet and Perry Farm in that these units do not correlate to the true Lenapah Limestone. These data also support the conclusions of Moore (1937b) and Jewett (1941) that the Idenbro type section (alternative locality) correlates to bed 3 at the Lenapah Limestone type section and that the nodular limy shale (i.e., reported here as Perry Farm) does correlate, in part, to the lower 15 ft (4.6 m) of limestones at the Lenapah Limestone type section (see discussion in text). Lastly, these findings agree with regional correlations (see all cross sections in Supplemental File 4) that the type sections of the Idenbro Limestone Member and Lenapah Limestone immediately underlie the black Nuyaka Creek Shale Member.

Alternate Type Idenbro Limestone Member (Jewett, 1941)
TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA
SOME NOMENCLATURAL IMPLICATIONS



Div. Beds Foss. Struct. Name

T. 32 S., R. 19 e County Labette Co

Sec. 2

Locality description- near Idenbro, Ks.

Measured by- J.M.J. Date- 1939

Remarks-

Lenapah

Bed No.	Description	Thickness
	Limestone - gray, mostly dense - nodular algae? - Weathers flaky	3±
	Shale, limy, with many limy nodules	10±
	Limestone - nodular, shaly, Marginifera Squamularis	2±
	Shale limy	

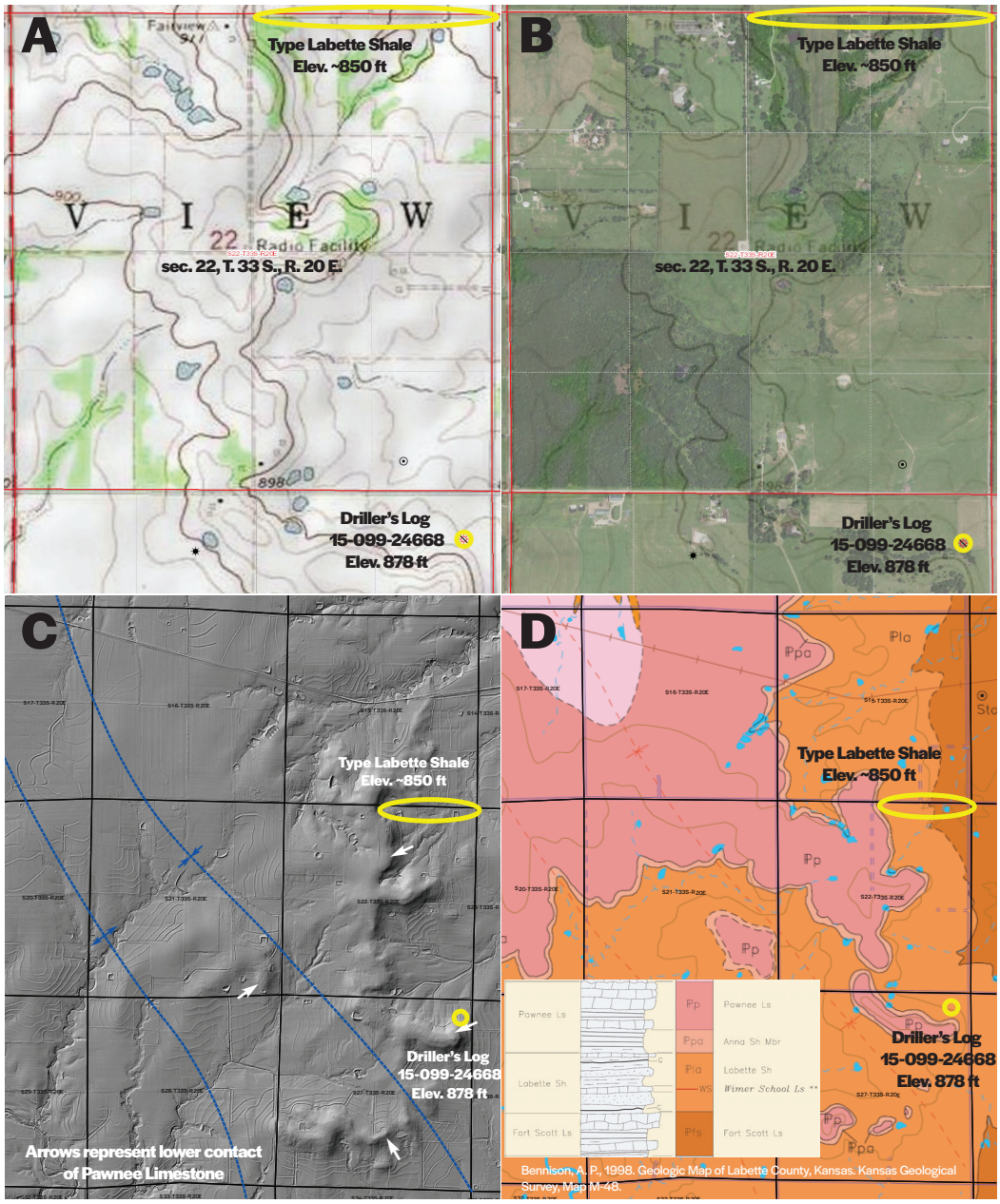
Note:- all stones in Parsons quarry (upper ledge)

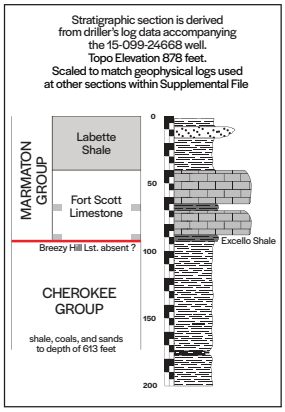
Note. Upper pt. of this section (Idenbro Ks) makes dip slope near Idenbro and same as dip made near Angola - on to near Coffeyville

S. R.

Type Labette Shale (Jewett, 1941)

TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA





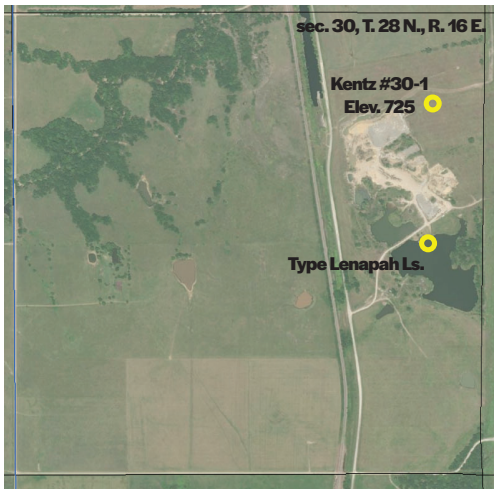
Aerial view of sec. 22, T. 33 S., R. 20 E. in Labette County, Kansas. The type Labette Shale (Jewett, 1941, p. 312) is located along north line of NE ¼ sec. 22, T. 33 S., R. 20 E. in Labette County, Kansas. There are no documented outcrops of this unit in its entirety. See also Moore (1898, p. 36) and Jewett (1945). A) Topographic map uses 10 feet (about 3 m) contouring. B) Aerial photograph with topographic contouring. C) LiDAR image of type locality and surrounding area. D) Mapping units in the area surrounding the type locality. Each box outline (e.g., red box in panels A and B) in images represents 1 sq mile (1.61 sq km).

Observations: Our assessment via driller's log data demonstrates that the Fort Scott Limestone is approximately 50 ft (15.2 m) beneath the surface 1 mile to the south of the Type Labette Shale. The Pawnee Limestone makes the ridge a short distance from the oil well. This ridge has been mapped as Pawnee Limestone and is easily traced in LiDAR. Therefore, we conclude the Labette Shale is at the correct stratigraphic position between the Fort Scott and Pawnee Limestone formations.

Type Lenapah Limestone (Ohern and Garrett, 1912; Jewett, 1941)

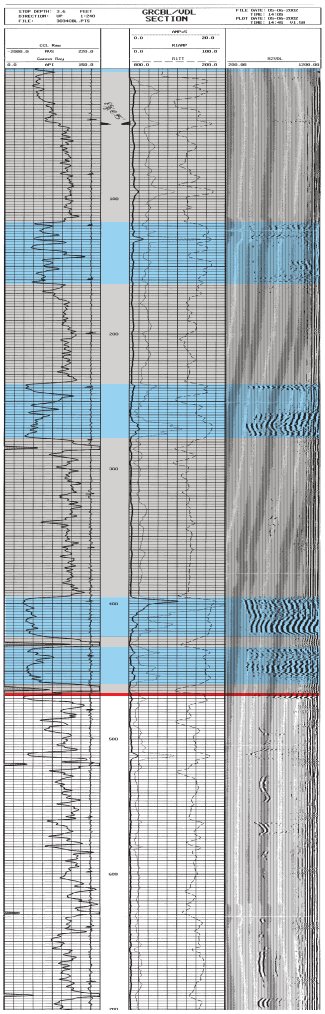
TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA

SOME NOMENCLATURAL IMPLICATIONS

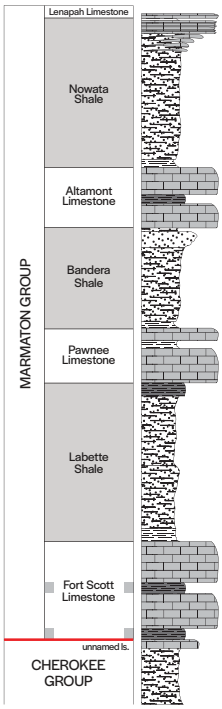


Aerial view of sec. 30, T. 28 N., R. 16 E. in Nowata County, Oklahoma. The type section of the Lenapah Limestone (Jewett, 1941) is located at NE sec. 30, T. 28 N., R. 16 E. For additional information, see Ohern and Garrett (1912) and Moore (1937b, p. 55). Image coverage is 1 sq mile (1.61 sq km).

Well: Kentz #30-1
2020 FSL, 2306 FWL of NE/4 sec. 30,
T. 28 N., R.16 E., Topo Elev. = 725 ft.



See text accompanying cross sections for more detailed discussion of nomenclature.



Type Section of the Lenapah Limestone
from Jewett (1941). See also
Moore et al. (1937, p. 55).
Measured in now flooded part of quarry.

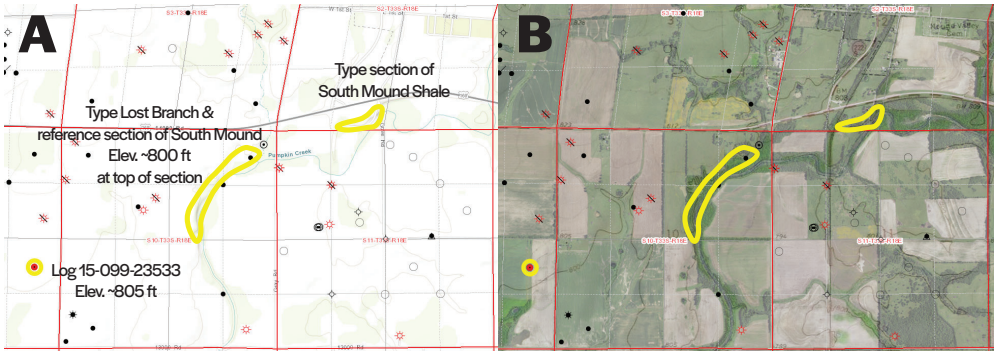
Observations: The original discussion of the Lenapah Limestone by Ohern and Garrett (1912) indicates the unit was first described in a quarry 1.5 miles (2.4 km) due north of the town of Lenapah. Moore (1937b) indicates the original unit descriptions came from a now-flooded portion of this quarry, which suggests much of the interval described in prior works is below the surrounding ground elevation. The lower 15 feet (4.6 m) of the section at this location was described by Moore (1937b) as being massive, yet with irregular wavy laminae and containing weathered surfaces. Moore (1937b) also states in his Stop 20 description that the lower 15 ft (4.6 m) of the section is equivalent to the Marginifera-bearing nodular limestones and shales farther north.

Our correlations of this interval through cross section E (about 1.6 miles [2.6 km] to the west) and analysis of petrophysical log data 0.25 miles (0.4 km) north of the Lenapah type section have determined the lower 15 ft (4.6 m) of the section attributed to the Lenapah Limestone is part of a discontinuous and localized carbonate within the upper Nowata Shale Formation.

Type Lost Branch (Heckel, 1991)

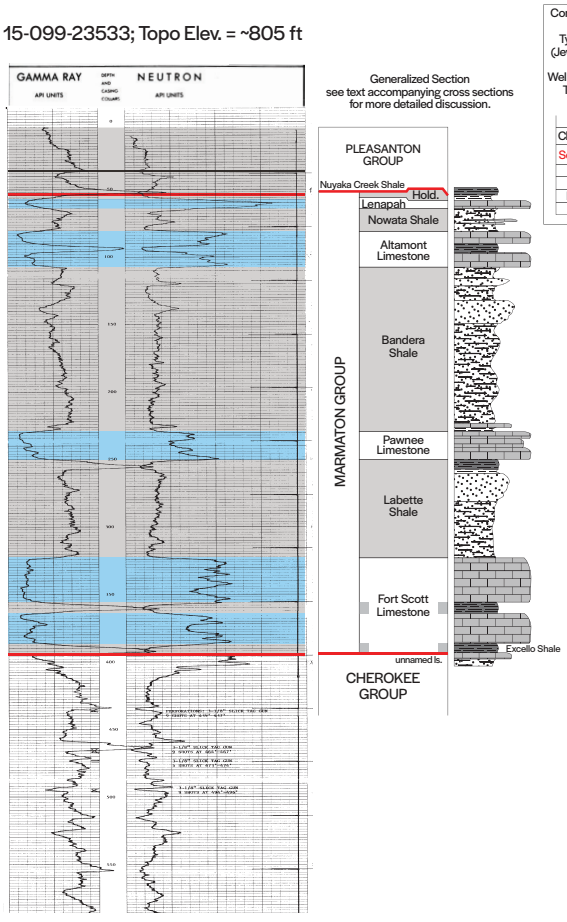
TYPE LOCALITY IS IN AGREEMENT WITH REGIONAL DATA

SOME NOMENCLATURAL IMPLICATIONS



Aerial view of sec. 10 and 11, T. 33 S., R. 18 E. in Labette County, Kansas. The type section of the Lost Branch Formation (Heckel, 1991, p. 14) composite is located in NE sec. 10, T. 33 S., R. 18 E. The name South Mound was informally used by Emery (1962) for strata near the town of South Mound in Neosho County, Kansas, approximately 20 miles (about 32 km) northeast of the South Mound Shale Member type section later defined by Jewett et al. (1965). The South Mound type section is located in SE SW sec. 2, T. 33 S., R. 18 E. in Labette County, Kansas, about 0.5 miles (0.8 km) northeast of the Lost Branch type section. Topographic map uses 10 ft (about 3 m) contouring. Each red outline in image represents 1 sq mile (1.61 sq km).

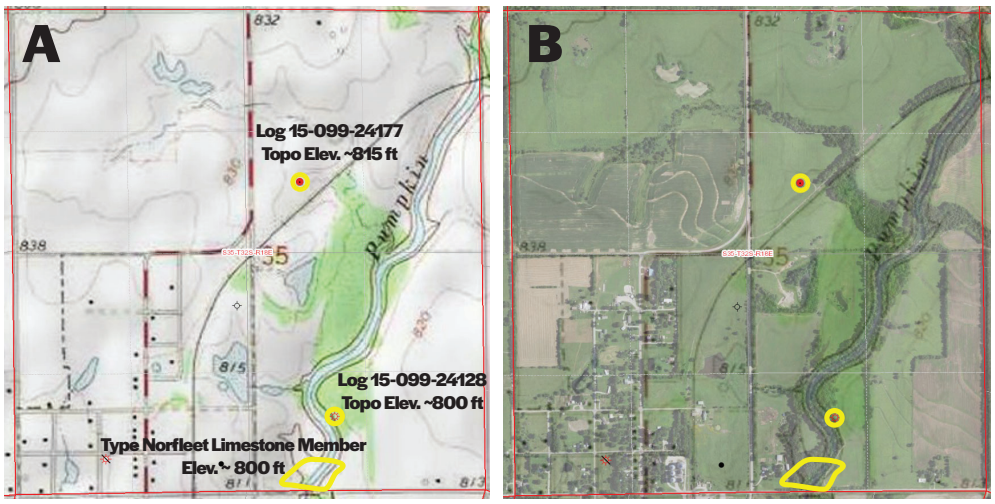
15-099-23533; Topo Elev. = ~805 ft



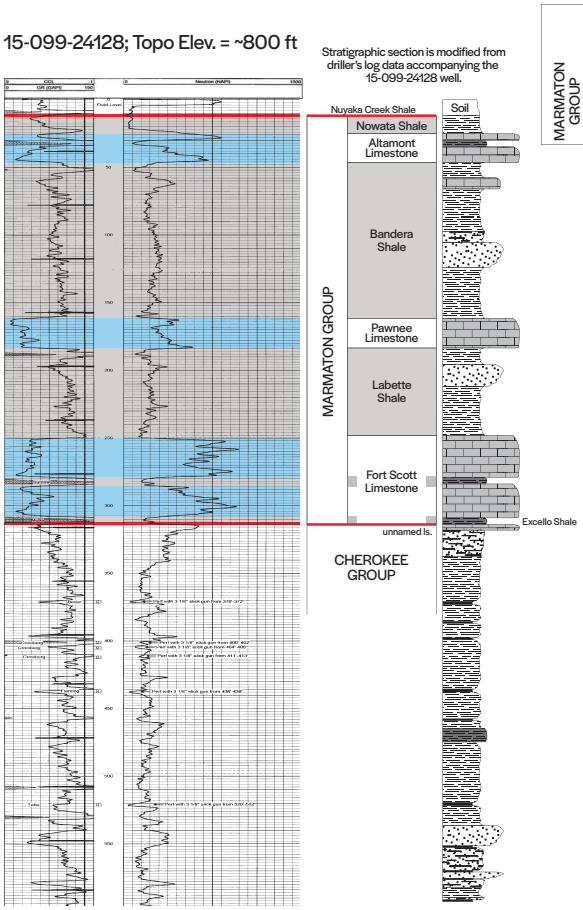
Observations: Two black fissile shales are found within the composite section at the type Lost Branch (Heckel, 1991, p. 14). These two shales are historically identified as the Nuyaka Creek and Tacket shales. Our regional correlations strongly support a northeast-southwest trending facies belt during deposition of the Pennsylvanian strata. The petrophysical log 15-099-23533 illustrated here is about 0.6 miles (about 1.0 km) west-southwest of this type locality along depositional strike. Though this petrophysical log is not included within our cross sections, comparison can be made to cross section E (Supplemental File 4), which is located about 3.5 miles (5.6 km) northeast of this location along this depositional strike (e.g., logs 15-099-23999 and 15-099-24148). Our regional and local assessment of strata agrees with the identification of the black fissile Nuyaka Creek within the Lost Branch type section composite. Based on the stratigraphic succession illustrated by Heckel (1991, p. 14), in addition to the overall petrophysical signal observed regionally for this interval, we make the following observations: 1) These data are in agreement with the interpretations of Heckel (1991) that the Altamont Limestone underlies this composite section. 2) The black fissile shale at the top of the composite section is that of the Mound City Shale Member, or possibly a combined Mound City and Hushpuckney shale, as these shales are in stratigraphic proximity with each other in cross section E (Supplemental File 4).

Type Norfleet Limestone Member (Jewett, 1941)

TYPE LOCALITY IS IN CONFLICT WITH REGIONAL DATA



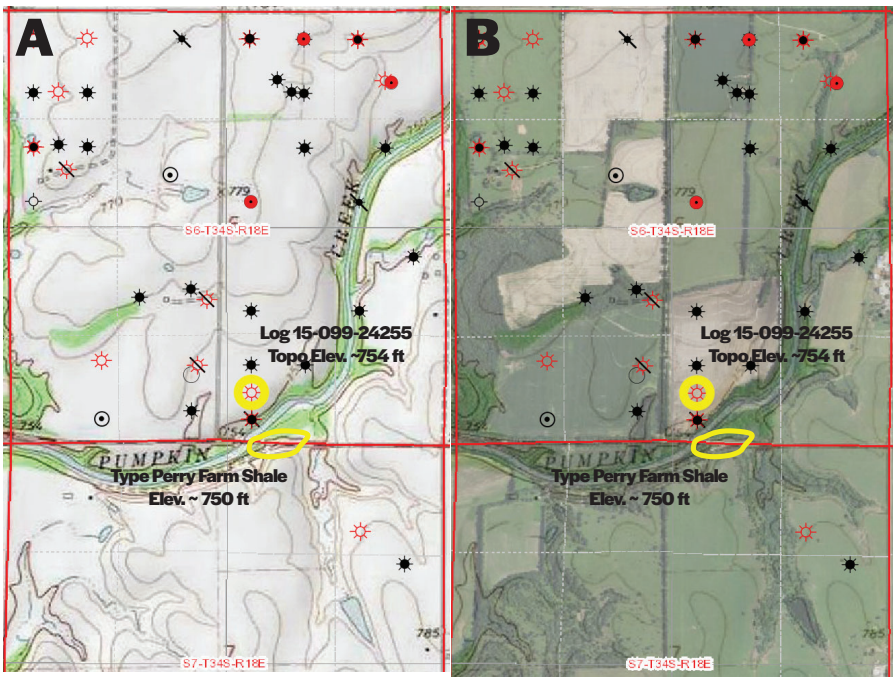
Aerial view of sec. 35, T. 32 S., R. 18 E. in Labette County, Kansas. The type section of the Norfleet Limestone Member (Jewett, 1941) is located in SE sec. 35, T. 32 S., R. 18 E. See also Jewett (1945, p. 44). A) Topographic map uses 10 ft (about 3 m) contouring. B) Aerial photograph with topographic overlay. Each red outline in image represents 1 sq mile (1.61 sq km).



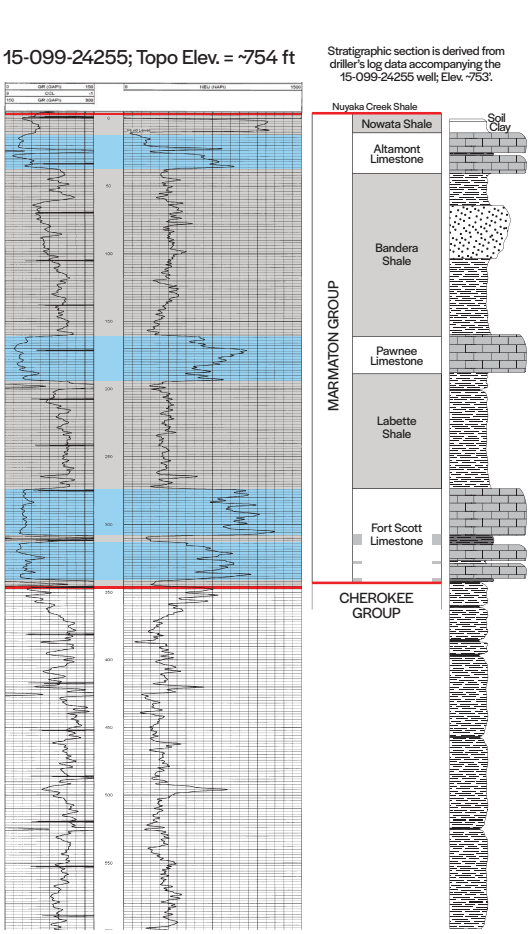
Observations: The Norfleet Limestone Member of the Lenapah Limestone, as defined at the unit's type locality, appears to be at a stratigraphic position equivalent to the Nuyaka Creek Shale Member (see prominent gamma-ray peak in log). Alternatively, should the outcrop assessed by Jewett (1941) be adjusted by about -20 feet (about -6 m) in elevation, then the black shale facies of the Norfleet would be at a stratigraphic position equivalent to the Lake Neosho Shale Member of the Altamont Limestone, which is similarly in conflict with regional nomenclature. A stratigraphic conflict is also observed at the Perry Farm Shale Member type section about 8 miles (12.9 km) southwest of the Norfleet type section. At the Perry Farm type locality, the Norfleet is similarly reported as having a black shale facies. Therefore, the Norfleet and Perry Farm type sections appear correlative to each other but are both at stratigraphic positions above the Lenapah Limestone for which they have been applied.

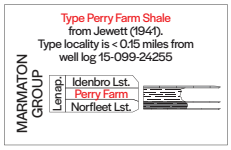
Type Perry Farm Shale Member (Jewett, 1941)

TYPE LOCALITY IS IN CONFLICT WITH REGIONAL DATA



Aerial view of sec. 6 and 7, T. 34 S., R. 18 E. in Labette County, Kansas. The type section of the Perry Farm Shale Member (Jewett, 1941) is located in NW NE sec. 7, T. 32 S., R. 18 E., east of the Pumpkin Creek bridge. See also Jewett (1945, p. 45). A) Topographic map uses 10 ft (about 3 m) contouring. B) Aerial photograph with topographic overlay. Each red outline in image represents 1 sq mile (1.61 sq km).





Observations: The Norfleet Limestone Member, as defined at this location, is at a stratigraphic position equivalent to the Nuyaka Creek Shale Member. With this observation, the Perry Farm Shale Member is at a stratigraphic position above the Nuyaka Creek. This observation is in alignment with findings at the type locality for the Norfleet Limestone Member about 8 miles (12.9 km) to the northeast, which contains identical conodont fauna within the black shale at that location (P. H. Heckel, personal communication, 2021). Our regional correlations demonstrate that the black fissile shale at this locality can be none other than that of the black fissile Nuyaka Creek shale. See cross sections H and I (Supplemental File 4) for information supporting this interpretation. Nowhere in our analysis did we find a prominent gamma-ray peak (typical of black fissile shales) within or immediately below the Lenapah Limestone. It is likely the case here that the Lenapah has been removed by the Nuyaka Creek unconformity observed in the region. See text for discussion of this observation. Also see analysis of the Norfleet Limestone Member type section.