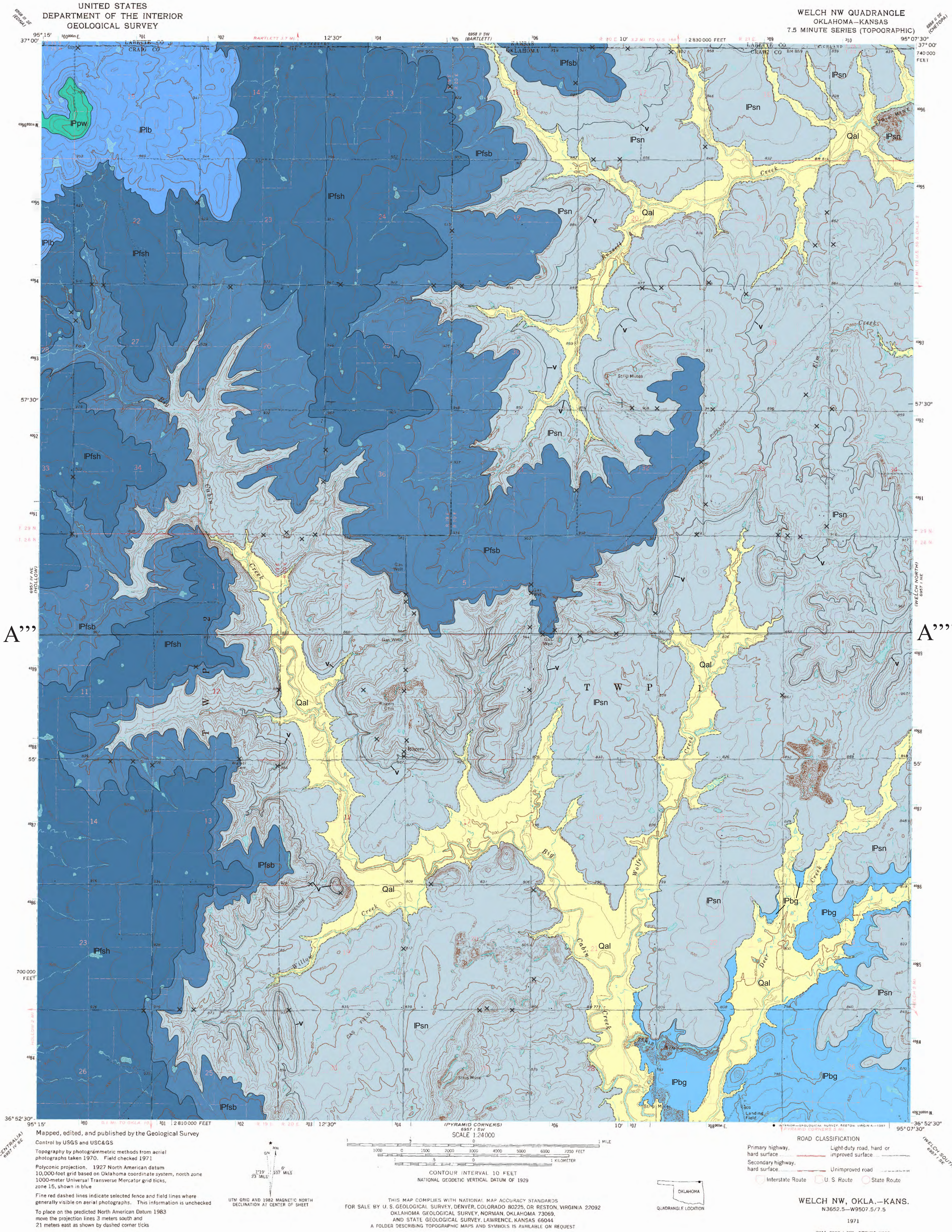


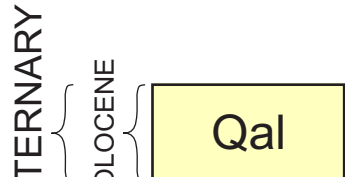


OKLAHOMA GEOLOGICAL SURVEY
Nicholas Hayman, Director

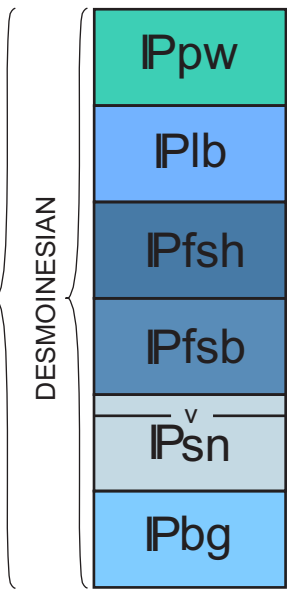
Oklahoma Geologic Quadrangle OGQ-104
Geologic Map of the Welch NW 7.5' Quadrangle



CORRELATION OF MAP UNITS



UNCONFORMITY

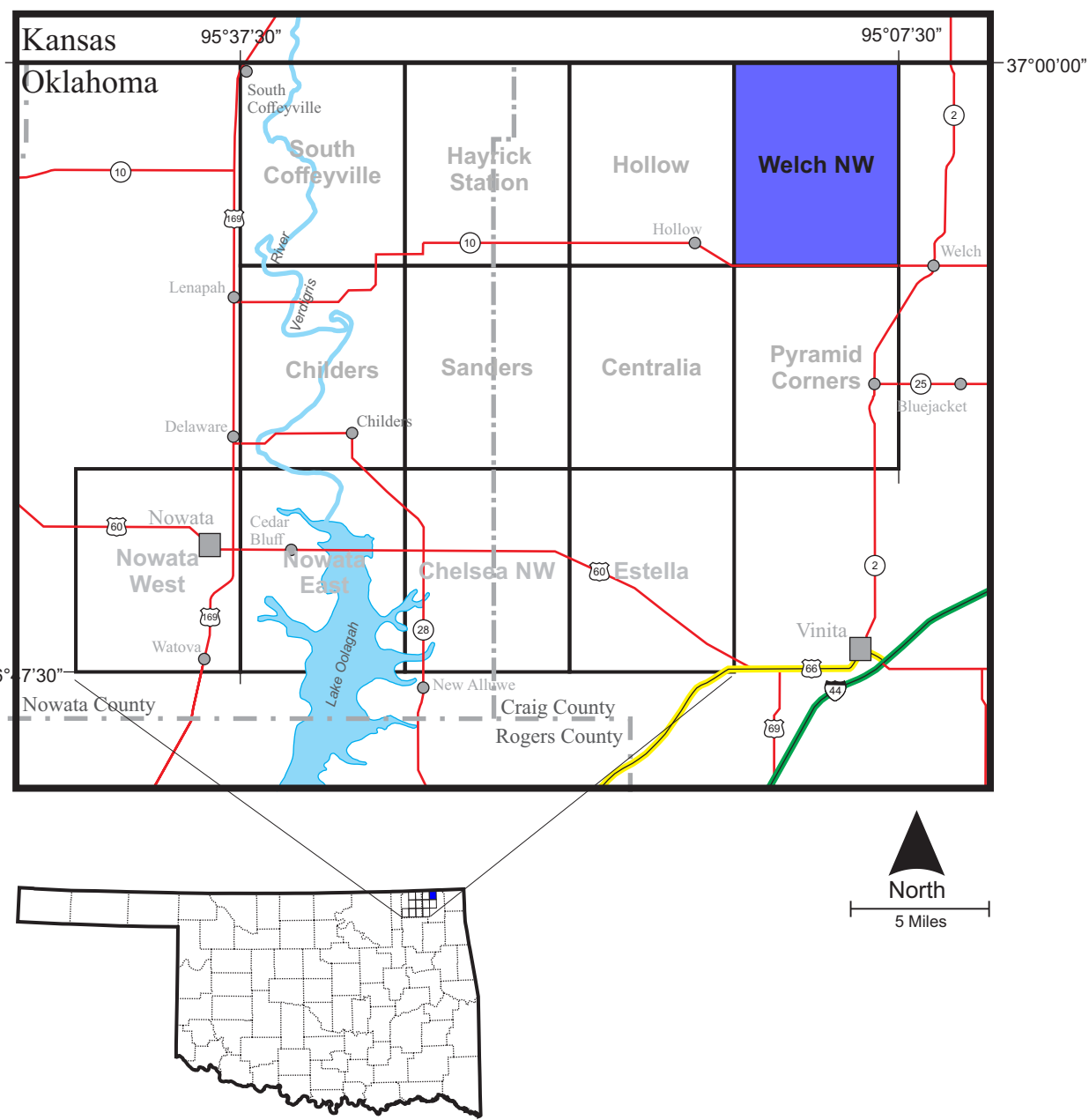


DESCRIPTION OF UNITS*

- Qal** ALLUVIUM (Holocene) - Clay, silt, sand, and gravel in channels and on flood plains of modern streams. Includes terrace deposits of similar composition located directly above and adjacent to modern channels and flood plains. Thickness: 0 to about 40 ft.
- Ppw** PAWNEE FORMATION (Pennsylvanian, Desmoinesian) - Includes, in descending order, the Coal City Limestone, Mine Creek Shale, and the Myrick Station Limestone; however, only the Myrick Station Limestone was observed in the quadrangle.
- Myrick Station Limestone is a medium light gray (N6) to light gray (N7), unbedded, skeletal mudstone to locally a coarse crystalline limestone. Fossil fragments mostly consist of crinoid debris associated with brachiopod fragments. Lower contact sharp but wavy, upper contact erosional. Thickness about 20 ft.
- Pfb** LABETTE SHALE (Pennsylvanian, Desmoinesian) - Light olive gray (5Y5/2) to dusky yellow (5Y6/4), occasionally medium light gray (N6), laminated, very silty to sandy, micaceous, concretionary clay shale; concretions dusky red (5R4/2) to moderate red (5R5/4), composed of hematite and/or siderite(?), and usually occur sporadically throughout formation as 1-3' diameter discoid-shaped clasts. Clay shale predominantly non-calcareous, although some narrow horizons are weakly calcareous (particularly those associated with abundant concretions). Locally, various non-descript very sandy or sandstone horizons occur; mostly these sand horizons are planar laminated to thin-bedded, but one at 15 ft above base of the Labette is trough-cross-bedded.
- Near the top of the formation, a thick sequence of interbedded sandstone and shale occurs (Paru sandstone). Where present, the base of the Paru sandstone occurs about 17 ft below the top of the formation, consisting of 9-10 ft of dusky yellow (5Y6/4), friable, thin- to medium-, trough-cross-bedded, fine-grained, non-calcareous, argillaceous sandstones, alternating every 6" to 3" with intervals consisting of well-laminated, calcareous, very fine-grained sandstone and shale; from the top of Paru to base of the Pawnee find typical silty clay shale of the Labette.
- A black fissile, phosphatic shale called the Anne Shale may occur locally above the Paru sandstone through to the top of the formation. Thickness of unit varies from 0 to 7 ft.
- In the map area the Labette Formation is 70 ft thick.
- Pfsh** FORT SCOTT FORMATION (Pennsylvanian, Desmoinesian) - Formation is subdivided into two informal units for purposes of mapping: a lower unit, IPfsh corresponding to the Black Jack Creek Limestone, and an upper unit, IPfsh that includes the Little Osage Shale and the Higginsville Limestone.
- The basal Black Jack Creek Limestone (IPfsh) consists of light gray (N7) to medium light gray (N6), thin to medium, wavy bedded whole-fossil wackestones and mudstones. Bedding varies from 2' to as much as 16' thick with thicker bedding more frequent toward top of exposure; wavy bedding contacts due (in part) to stromatolite bedding. Fossils dominated by spirifer and productid brachiopods, and crinoid debris; algae and fusulinids common in some intervals. The Black Jack Creek Limestone Member ranges between 10-35 ft thick, thinning to the south.
- The upper Higginsville interval (IPfsh) consists of the Higginsville Limestone proper at top and the Little Osage Shale at base. In the map area, the Higginsville is poorly exposed and highly recessive interval and is only observed as a series of discontinuous limestone beds and float nodules that occur on steeper hill sides. The limestone is usually a moderate orange pink (5YR8/4) to grayish orange (10YR7/4), slightly argillaceous (locally cherty), skeletal mudstone that is most likely interbedded with calcareous shale. Thickness of interval ranges from 10-20 ft, thickening to the southwest. The Osage Shale is predominantly a black (N1) fissile, phosphatic shale that grades upward into a 5 to 7 ft, thick, thickly laminated, medium gray (N5) to medium dark gray (N4) slightly silty and calcareous clay shale.
- Overall, the Fort Scott Formation varies from 20-55 ft thick.
- Psn** SENORA FORMATION (Pennsylvanian, Desmoinesian) - A silty to sandy clay shale, interlaminated with 0.25'-1' thick, very fine-grained sandstone and siltstone beds; silt and sand content increasing adjacent to significant sandstone intervals; clay shale bedding laminated, becoming blocky where deeply weathered, color variable, ranging, from the most frequent to infrequent medium light gray (N6), brownish gray (5Y6/4), grayish orange (10YR7/4), very pale orange (10YR6/2), dark yellowish orange (10YR6/2), pale brown (5YR5/2), light brown (5YR5/6), grayish yellow (5Y8/4), and yellowish gray (5Y7/2); typically, shale associated with concretionary zones tend to be more orange or brown instead of gray in hue, while those shales associated with coal seams tend to be harder, more evenly laminated, and have a medium dark gray (N4) color; clay is predominant cement, calcite rare.
- Clay shales immediately above coal seams tends to be harder, silt-free, slightly phosphatic, with slightly thicker laminated bedding, and are weakly calcareous; color usually a medium dark gray (N4).
- The interlaminated sandstones and siltstones are friable to poorly indurated, usually a very pale orange (10YR8/2), pale orange (10YR8/2), or dark yellowish orange (10YR6/2); sandstone more common than siltstone, typically fine- to very fine-grained; predominant cement is clay, with a possible weak silica.
- Ironstone concretions occur sporadically throughout the shale section, but concentrations may occur just above the Verdigris Limestone and the Middle Taft sandstone. Concretions composed predominantly of hematite, sometimes siderite may occur as 0.5'-2'-2' thick, dense discontinuous beds in the concentrated horizons, but normally occur as small (between 1'-2") individual, hollow, ovoid-shaped clasts; color a light red (5R6/6) to moderate red (5R5/4).
- There are several stratigraphic horizons of note in the Senora Formation:
- Excallo Shale:** Predominantly a medium dark gray (N4) to dark gray (N3), well-laminated to fissile, phosphatic clay shale; however, upper 2'-3' of interval a light brownish gray (5Y6/4) to pale brown (5YR5/2), laminated, slightly silty, calcareous, fossiliferous clay shale. Phosphate nodules throughout lower part of member, occurring as 0.25'-0.5', ovoid-shaped clasts. Thickness ranges from 3-6 ft, averaging 4 ft.
- Brezzy Hill Limestone:** Grayish orange (10YR7/4) to medium light gray (N6), with local dark yellowish orange (10YR6/6) streaks along bedding contacts and fractures, alternating thin- to medium-, wavy bedded, whole-fossil and skeletal wackestone and mudstone. Bedding varies from 3'-16' thick, with thinner bedding characterized by skeletal textures; medium bedding usually composed of whole-fossil textures. Fossils dominated by small productids and mesolobids, along with large crinoid stems; chertified sponges present.
- Base of the Brezzy Hill occurs consistently 11 ft. below the top of the formation, and mimics the Fort Scott-Senora contact.
- Overall thickness of the bed about 7 ft.
- Kinnison Shale:** Medium light gray (N6) in lower half, becoming moderate yellowish brown (10YR5/4) in upper half, fissile to well-laminated, silty clay shale with very fine-grained sandstone and siltstone partings. Silt and sand increasing toward top of member. Base occurs at the Iron Post coal; clay shale just above coal tends to be a medium dark gray (N4), hard, thickly laminated clay shale. Thickness of member about 13 ft.
- Iron Post coal:** Poorly exposed; although extensively mined throughout the quadrangle; where observed it is characterized by a black (N1) carbon smear 1'-1.5' thick.
- Verdigris Limestone (V):** medium dark gray (N4) skeletal mudstone, but may weather to a medium light gray (N6), grayish red (5R4/2), or grayish orange (10YR7/4) color. Represented either by a single massive bed, or by a couple of 6'-12' thick planar skeletal mudstone beds; top 3'-4' becoming a wavy laminated whole-fossil mudstone to wackestone with large productid brachiopods and large crinoid stems. Thickness about 3-3.5 ft.
- Weir-Pittsburg coal:** Poorly exposed interval of dark gray (N3) to medium dark gray (N4), hard, thickly laminated slightly silty clay shale above a 1'-2' thick carbon smear.
- Basal contact of the Senora Formation placed at the stratigraphic horizon of the Weir-Pittsburg coal. Total thickness of the formation about 350 ft.
- BOGGY FORMATION (Pennsylvanian, Desmoinesian)** - Generally a very silty to sandy, laminated clay shale, with two intervening sandstone members (Taft Sandstone and Bluejacket Sandstone).
- Clay shales variable in color, ranging from medium light gray (N6), grayish orange pink (5YR7/2), to light brown (5YR5/6), sometimes moderate red (5R5/4) to pale red (10R6/2) near prominent sandstones; laminated to blocky bedded, very silty to even sandy, with silty and very fine-grained sandstone interbeds and partings; sand and silt content increasing proximal to significant sandstone intervals; a medium gray (N5) concretionary, calcareous clay shale occurs near base.
- Mapping stratigraphic horizons within the Buggy Formation include, in descending order the:
- Taft Sandstone:** color a moderate yellow (5Y7/6), dusky yellow (5Y6/4) or dark greenish yellow (10YR6/6), grading toward top to a light brown (5YR5/6) and pale reddish brown (10R5/4); moderate brown (5YR4/4) oxide spots common, giving sandstone an overall mottled appearance; texturally, sandstone is moderately indurated, locally indurated, thin- to medium-bedded, very fine- to fine-grained, and slightly siliceous. Basal third with trough-cross-bedding, middle third with tabular cross-bedding, and upper third having thin, planar bedding with ripplemark surfaces. Basal contact may be gradational with underlying shale lithology. Member thickness from 5 ft to as much as 15 ft, averaging about 8 ft thick.
- Bluejacket Sandstone:** Grayish orange (10YR7/4) to dark yellowish orange (10YR6/6), well-indurated, sucrosic-looking, thin-bedded, fine-grained, siliceous sandstone. Bedding planar, ranging from 1'-4' thick, with internal tabular cross-bedding. Total thickness about 5.3 ft, but may attain 7 ft in some areas.
- Only the uppermost 35-40 ft. exposed in quad.

SYMBOLS

- × Outcrop; geologic observation



Geologic Map of the Welch NW 7.5' Quadrangle, Craig County, Oklahoma

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2025