Data Control Points Used to Construct the Surficial Geology Map (M-122) of Geary County, Kansas

KGS OPEN-FILE
REPORT 2010-13

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Data Control Points Used to Construct the Surficial Geology Map (M-122) of Geary County, Kansas

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Introduction

This report is a supplemental reference to the Surficial Geology of Geary County, Kansas, map (M-122) (Sawin and West, 2010), and is a synthesis of the data control points and field notes used to construct the map.

The bedrock geology of Geary County was mapped in the field on U.S. Geological Survey topographic quadrangle maps at a scale of 1:24,000 (fig.1). Data control points used in mapping the bedrock geology are organized by quadrangle in this report. The locations of these control points are plotted on copies of the field maps in previous Kansas Geological Survey (KGS) open-file reports for Geary County (West and Sawin, 2005; West and Sawin, 2006; West and Sawin, 2007). The data control points in this report may be different from those reported in earlier open-file reports and therefore supersede those reports.

The stratigraphic names used herein are from Zeller (1968). Included in map M-122 is a stratigraphic rock column that depicts the vertical sequence, thickness, and lithologies of the geologic units. A short, generalized description of each geologic unit is also included. A west-east cross section shows the vertical relationship of the rock units.

Numbering System

Data control points are identified by the following letter prefixes. Sites may be identified by one or more of these designations.

1) Numbers preceded by the letter **G** refer to measured sections in the Geary County, Kansas, measured sections files of the Kansas Geological Survey. Numbering began with the first measured section in the book and proceeded sequentially to the last section.

2) Numbers preceded by the letter **J** refer to measured sections contained in KGS Bull. 39 (Jewett, 1941)**.**

3) Numbers preceded by the letters **GE** are sites examined and recorded specifically for this mapping project.

4) There are also sites indicated that are contained in a) a KSU master's thesis by Voran (1977), b) a south-central GSA guidebook on the Crouse Limestone (West, 1972), c) KGS Technical Series 6 by Mazzullo et al. (1997), and d) a KSU master's thesis by Griffin (1974).

5) An asterisk (*) to the left of the site number identifies sites that are on the Fort Riley Military Reservation.

Geary County, Kansas

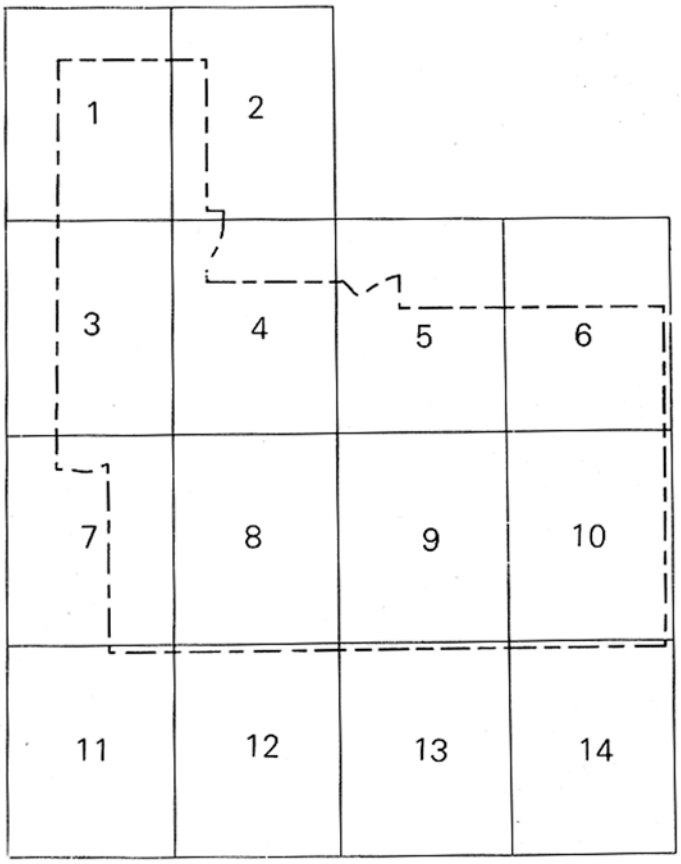


Figure 1. USGS 7.5-minute 1:24,000-scale quadrangles for Geary County, Kansas.

Photo Scale – red and white markings on staff are decimeters.

MILFORD QUADRANGLE

Field work was conducted during January–March of 2007.

GE-252 = Doyle (Towanda limestone) Shale exposed in access area on the north side of Milford Lake, top of Towanda limestone at 349 m (1145 ft); two digital photos, one of upper beds and one of lower beds; near center of NE1/4, NW1/4, NE1/4, Sec. 11, T.10S., R.4E., Geary Co., Kansas.

GE-253 = Winfield Limestone exposed along road on the north side of Milford Lake; Stovall limestone = 0.3 m (±1.0 ft) Grant shale = 4.0 m (11.5 ft), Creswell limestone = 0.8 to 0.9 m (2.5 to 3.0 ft) with the base of the Cresswell limestone at 363 m (1191 ft); two digital photos, one of Stovall and one of Cresswell; about 250 ft south and 150 ft east of north line SW1/4, SW1/4, Sec. 2, T.10S., R.4E., Geary Co., Kansas.

GE-254 = Doyle (Towanda limestone) Shale overlain by Pleistocene loess well exposed along north shore of Milford Lake with some red mudrocks of the Gage shale exposed between the Towanda limestone and Pleistocene units; top of Towanda limestone at 355 m (1165 ft) with upper bed massive [approximately 0.8 m (2.6 ft) thick], mud-

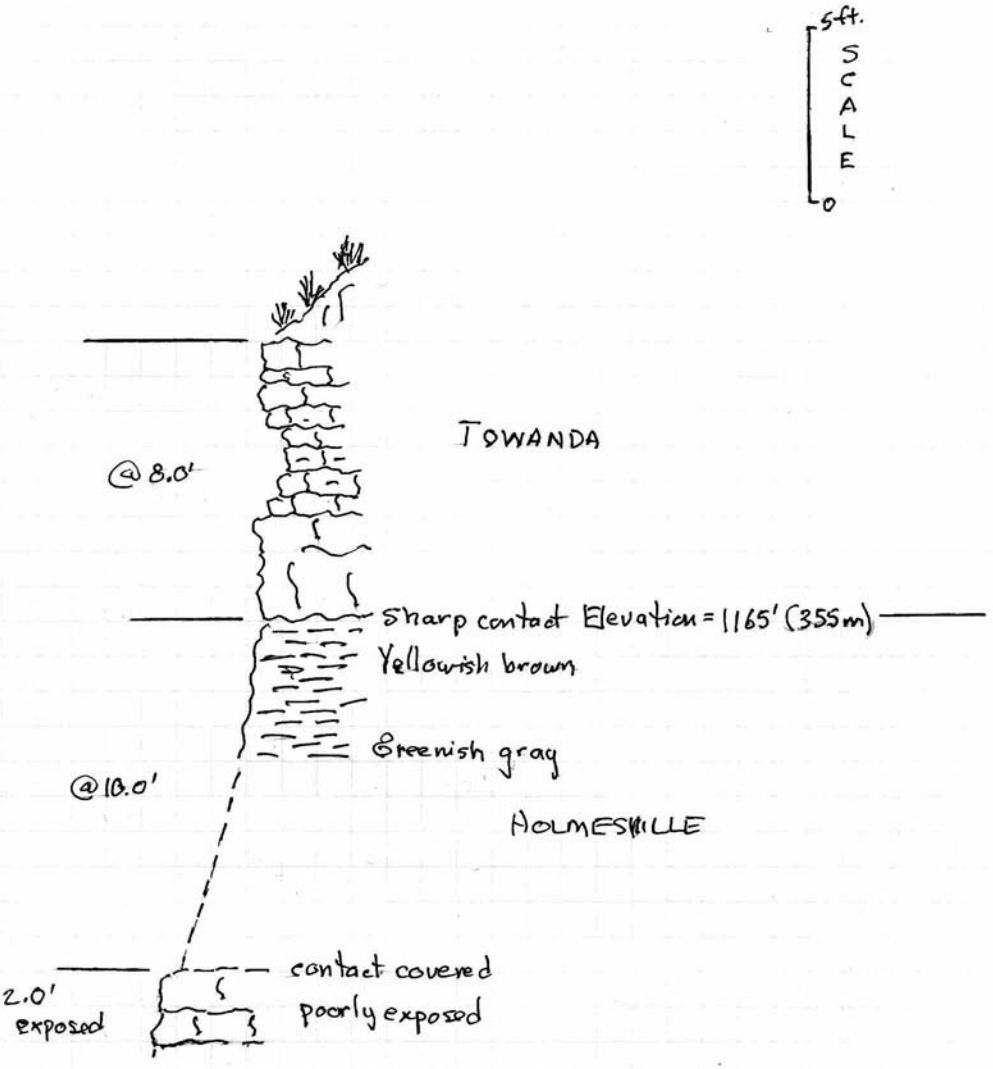
cracked, vuggy, brecciated, and possibly bored; five digital photos, one of Gage and Towanda, one of Towanda, and a close-up of the top of the Towanda; just north of center of SE1/4, SW1/4, SW1/4, Sec. 2, T.10S., R.4E., Geary Co., Kansas.

GE-255 = Winfield (Cresswell limestone) Limestone exposed on the northeast side of an old quarry (labeled on the topo as a gravel pit), base of Cresswell limestone at 371 m (1217 ft); one digital photo; near center of south line NW1/4, NW1/4, NW1/4, Sec. 7, T.10S., R.5E., Geary Co., Kansas.

GE-256 = Winfield (Stovall limestone) Limestone exposed on south side of an old quarry (labeled as a gravel pit on topo), top of Stovall limestone at 367 m (1204 ft); Stovall is approximately 0.3 m (1.0 ft) thick; one digital photo; approximately 100 ft east of center of west line NW1/4, NW1/4, Sec. 7, T.10S., R5E., Geary Co., Kansas.

GE-257 = Doyle (Towanda limestone) Shale exposed on the east side of the Madison Creek arm of Milford Lake with approximately 2.4 m (8 ft) of Towanda limestone and 3 m (10 ft) of mostly covered underlying mudrock (Holmesville shale) and 0.6 m (2 ft) of a mostly covered limestone bed (see graphic section), base of Towanda limestone at 355 m (1165 ft); two digital photos; near center of S1/2, Sec. 7, T.10S., R.5E., Geary Co., Kansas.

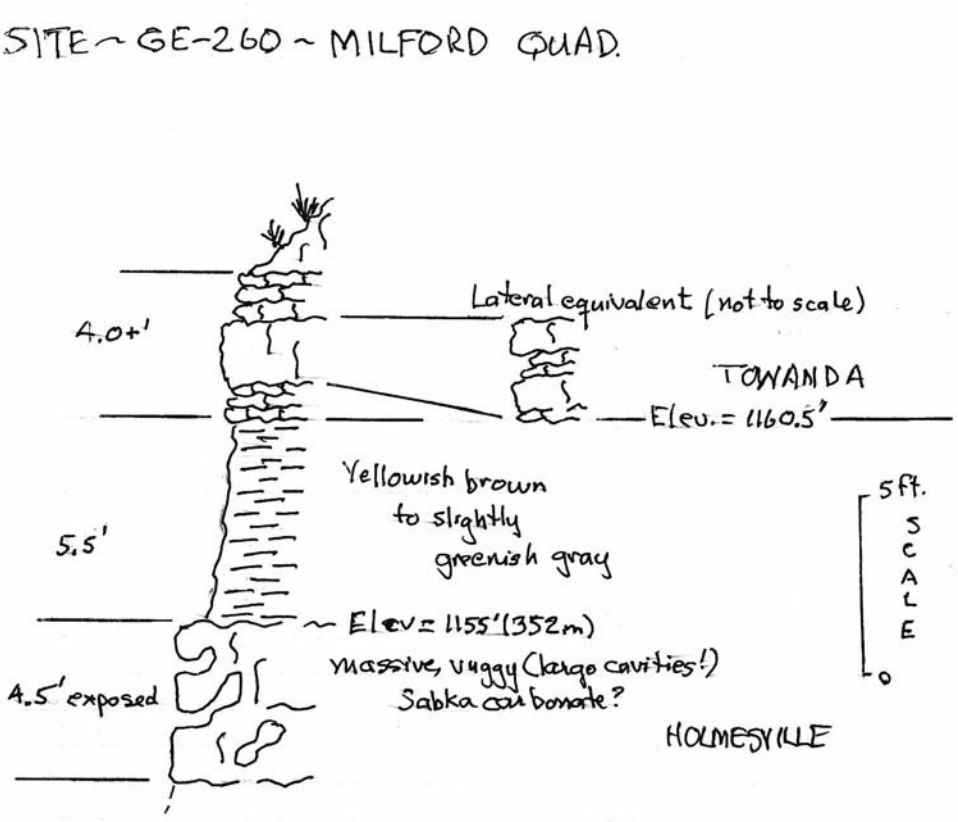
SITE ~ GE-257 ~ MILFORD QUAD.



GE-258 = Doyle (Towanda limestone) Shale exposed on a grassy slope on north side of access road to Milford Lake, with top of Towanda limestone at 358 m (1174 ft); approximately 0.25 mile due north of GE-257; one digital photo; near center Sec. 7, T.10S., R.5E., Geary Co., Kansas.

GE-259 = Winfield Limestone exposed in road cut on the northeast side of U.S. Highway 77, with base of the Stovall limestone at 373 m (1224 ft); three digital photos, one of exposure on northeast side of highway, one of the Cresswell on the southwest side of highway, and one of the upper Grant shale and Cresswell limestone on the northeast side of highway; approximately 100 ft south of center of north line SW1/4, SE1/4, NE1/4, Sec.7, T.10S., R.5E., Geary Co., Kansas. This is location of Mazzullo et al. (1997) Sec. 117.

GE-260 = Doyle (Towanda limestone and Holmesville shale) Shale exposed west of Milford Cemetery along east shore of Milford Lake; top of a massive, vuggy limestone bed in Holmesville shale at 352 m (1155 ft). Above this bed is 1.7 m (5.5 ft) of mudrock overlain by 1.2 m (4.0 ft) of thin- to platy-bedded Towanda limestone with base at 354 m (1160 ft); see graphic section; five digital photos; near center of south line of SE1/4, SW1/4, NE1/4, Sec. 18, T.10S., R5E., Geary Co., Kansas.

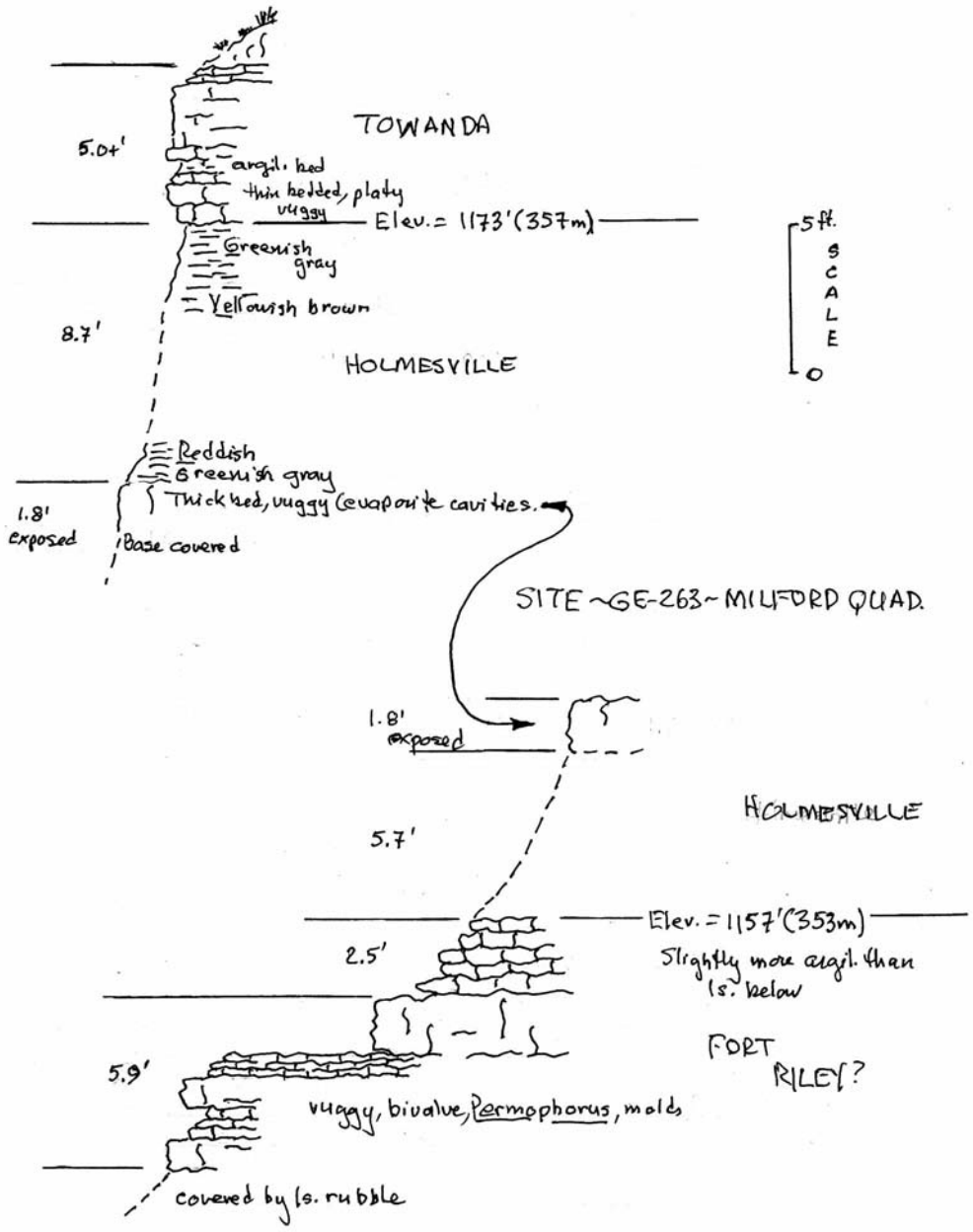


GE-261 = Winfield (Stovall limestone) Limestone and Doyle (Gage shale) Shale well exposed along northeast side of U.S. Highway 77, with Stovall limestone at 380 m (1247 ft); three digital photos, one of Stovall and two of the Gage; approximately 200 ft east and 250 ft north of center of SW1/4, NE1/4, Sec. 29, T.10S., R5E., Geary Co., Kansas. This is the location of Mazzullo et al. (1997) section 116.

GE-261 (cont)

GE-262 = Doyle (Towanda limestone and Holmesville shale) Shale exposed along the north side of access road to Farnum Creek arm of Milford Lake, with base of Towanda limestone at 357 m (1173 ft); see graphic section; three digital photos; near center of SW1/4, SE1/4, NW1/4, Sec. 29, T.10S., R.5E., Geary Co., Kansas.

SITE~GE-262- MILFORD QUAD.



GE-263 = Doyle (Holmesville shale) Shale and Barneston (Fort Riley limestone) Limestone exposed approximately 0.25 mile northwest of GE-262 with sequence that overlaps and is below that at GE-262 (see graphic section); top of Fort Riley limestone at 353 m (1157 ft); five digital photos, one of all exposed beds, one of surface with molds of bivalves, one of the lower beds, one of the middle beds, and one of the upper beds; center SW1/4, NW1/4, Sec. 29, T.10S., R.5E., Geary Co., Kansas. This sequence is only exposed because water level in lake is very low.

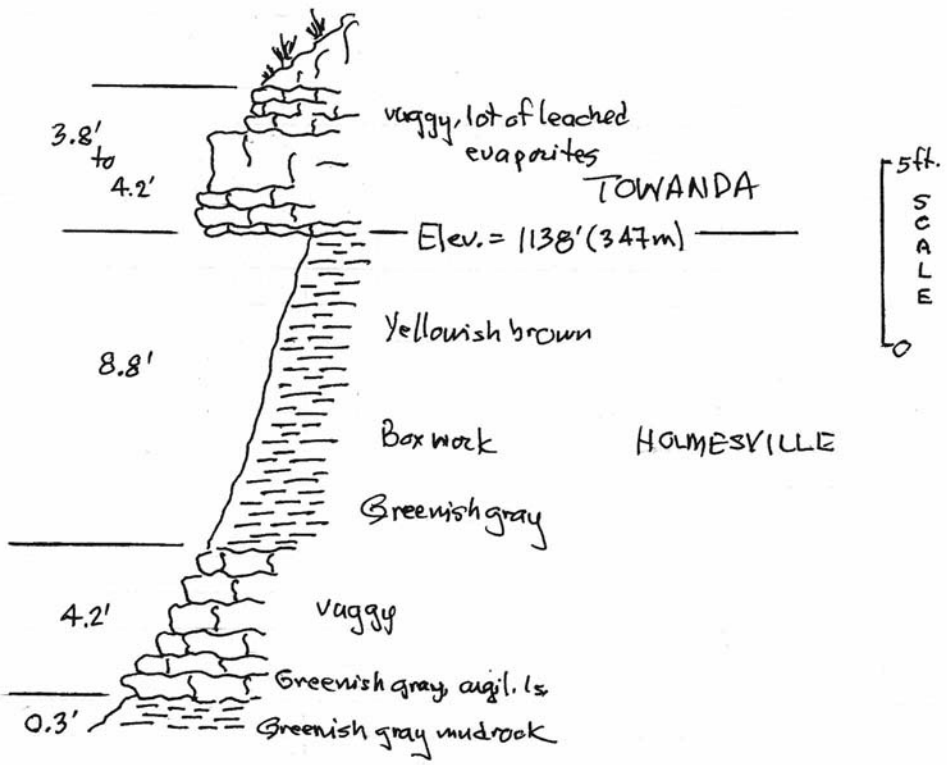
GE-263 (cont.)

GE-264 = Winfield (Stovall limestone, Grant shale, and Cresswell limestone) Limestone exposed along road cut on northeast side of U.S. Highway 77 north of Rush Creek, with base of Stovall limestone at 378 m (1240 ft); two digital photos, one of base of Stovall and the other of sequence above Stovall; approximately 250 ft east of center of NE1/4, NW1/4, SE1/4, Sec. 29, T.10S., R.5E., Geary Co., Kansas.

GE-265 = Winfield (Cresswell limestone) Limestone exposed in road cut on both sides of U.S. Highway 77, erosional top of Cresswell limestone at 384 m (1260 ft) with 0.6 to 0.9 m (2 to 3 ft) of overlying soil on east side of highway; two digital photos; near center of west line NW1/4, SE1/4, SE1/4, Sec. 29, T.10S., R5E., Geary Co., Kansas.

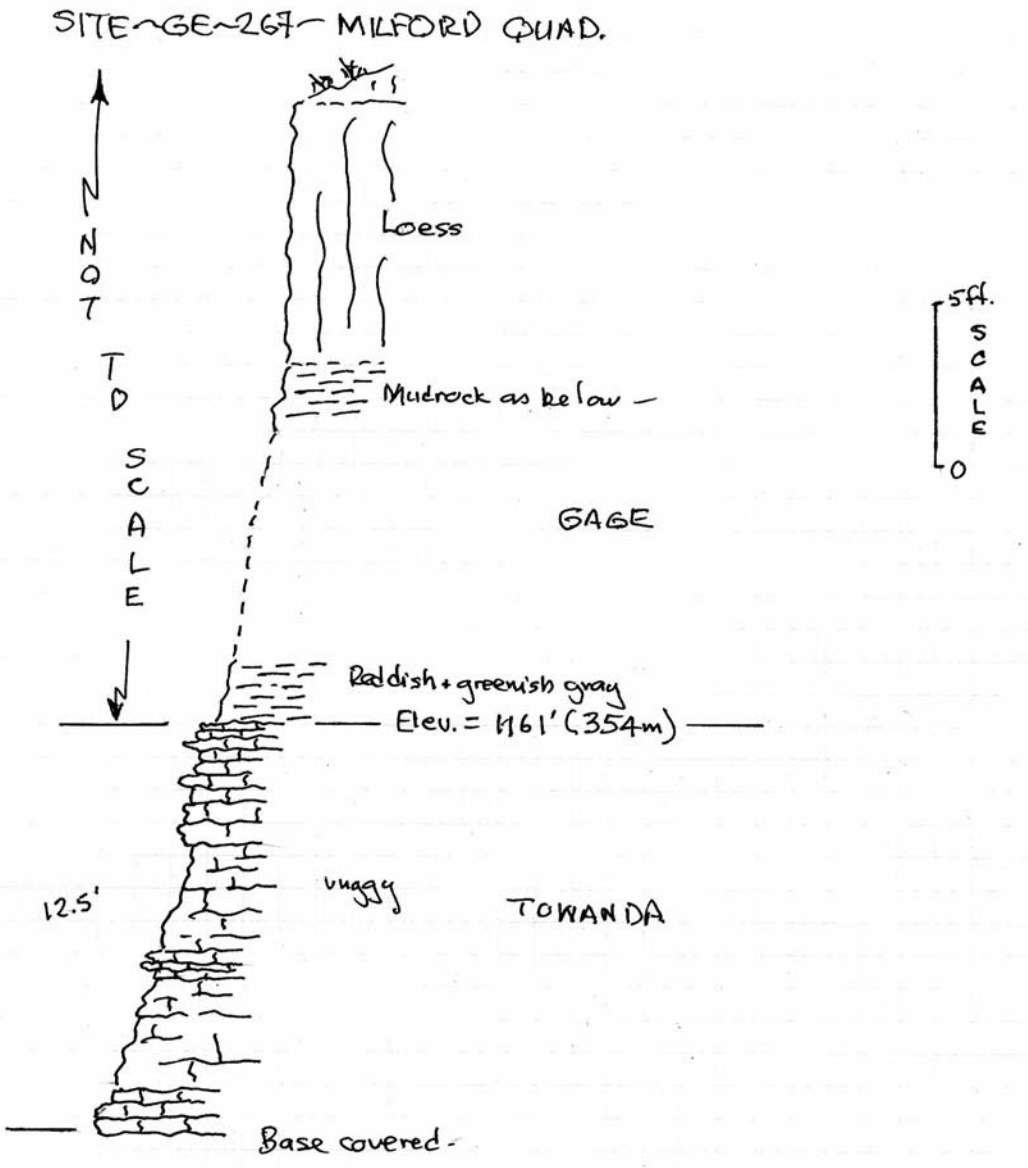
GE-266 = Doyle (upper Holmesville shale and lower Towanda limestone) Shale exposed along Milford Lake shore, with base of Towanda limestone at 347 m (1138 ft), see graphic section; four digital photos; near center of SE1/4, Sec. 24, T.10S., R.4E., Geary Co., Kansas.

SITE ~ GE-266 ~ MILFORD QUAD



GE-267 = Doyle (Towanda limestone and Gage Shale) Shale exposed in an old quarry, with top of Towanda limestone at 354 m (1161 ft); 4 m (12.5 ft) of Towanda limestone and 5 to 6 m (15 to 20 ft) of Gage shale; see graphic section; six digital photos; approximately 300 ft east of center of S1/2 of SW1/4, Sec. 24, T.10S., R.4E., Geary Co., Kansas.

GE-267 (cont.)


SITE~GE~267~ MILFORD QUAD.
NOT TO SCALE
Loess
Mudrock as below
GAGE
Reddish + greenish gray
Elev. = 1161' (354m)
12.5'
vuggy
TOWANDA
Base covered
5ft.
SCALE
0

GE-268 = Doyle (Towanda limestone and Holmesville shale) Shale, with base of Towanda limestone at 345 m (1132 ft) exposed along lake shore; 5 m (15.5 ft) of Towanda limestone and gray-green mudrock of the Holmesville shale below; one digital photo; approximately 300 ft south of center of NW1/4, SE1/4, Sec. 25, T.10S., R4E., Geary Co., Kansas.

GE-269 = Doyle (Towanda limestone and gray-green mudrock of upper Holmesville shale below) Shale exposed along lake shore, with base of Towanda limestone at 348 m (1142 ft); basal bed of the Towanda limestone is a laterally discontinuous bed of microbial/algal stromatolites, some are vase-shaped masses that merge into micro-atolls that are several dm in diameter, others are elongated to a length of several dm; seven digital photos; approx. 200 ft west of center of SW1/4, SE1/4, Sec. 36, T.10S., R.4E., Geary Co., Kansas.

GE-269 (cont.)

GE-295 = Doyle (lower Towanda limestone and uppermost Holmesville shale) Shale exposed in road cuts on both sides of U.S. Highway 77, with base of Towanda limestone at 365 m (1190 ft); one digital photo on the northeast side of U.S. Highway 77; approximately 300 ft east of center of NW1/4, Sec. 4, T.11S., R.5E., Geary Co., Kansas.

Supplemental Sites (Points A through G do not have GPS coordinates or photographs)

Point A = Winfield (Cresswell limestone) Limestone exposed on north side of Kansas Highway 82 at ±365 m (1197 ft); near center of north line NW1/4, NE1/4, NE1/4, Sec. 2, T.10S., R4E., Geary Co., Kansas.

Point B = Doyle (Towanda limestone) Shale along the west side of the Madison Creek arm of Milford Lake; surface of a limestone block with very well preserved mudcracks; near center NW1/4, SW1/4, Sec.7, T.10S., R.5E., Geary Co., Kansas.

Point C = Doyle (Towanda limestone) Shale exposed in road and along lake shore; near center of east line of SE1/4, NE1/4, Sec. 35, T.10S., R.4E., Geary Co., Kansas.

Point D = Winfield (Cresswell limestone) Limestone at 375 m (1230 ft) exposed in road; southeast corner Sec. 26, T.10S., R.4E., Geary Co., Kansas.

Point E = Winfield (Cresswell limestone) Limestone at 370 m (1214 ft) exposed on east side of road; center of west line of SW1/4, NW1/4, Sec. 26, T.10S., R.4E., Geary Co., Kansas.

Point F = Winfield (Cresswell limestone) Limestone exposed in road cut on east side of Union Road, base of Cresswell limestone at 368 m (1207 ft); just northeast of center of south line of NE1/4, SE1/4, Sec. 34, T.10S., R.4E., Clay Co., Kansas.

Point G = Doyle (Towanda limestone) Shale exposed along lake shore, with base of Towanda limestone at ±350 m (1148 ft); approximately 300 ft east of center of south line of NW1/4, Sec. 36, T.10S., R.4E., Geary Co., Kansas.

FORT RILEY NE QUADRANGLE

Field work was conducted during January–March of 2007.

*GE-319 = Winfield (Cresswell limestone) Limestone exposed in road ditch on north side of road at 387 m (1270 ft); one digital photo; approximately 450 ft west of center of south line SE1/4, Sec. 22, T.10S. R.5E., Geary Co., Kansas.

*GE-320 = Winfield (Cresswell limestone) Limestone exposed in field drainage on north side of road, with base of Cresswell limestone at 391 m (1283 ft); one digital photo; approximately 200 ft west and 200 ft north of center of south line SE1/4, SE1/4, Sec. 27, T.10S., R.5E., Geary Co., Kansas.

*GE-321 = Winfield (Cresswell limestone) Limestone exposed in road ditch on east side of road, with base of Cresswell at 385 m (1263 ft); one digital photo; approximately 200 ft north of southwest corner Sec. 27, T.10S., R.5E., Geary Co., Kansas.

*GE-322 = Winfield Limestone exposed in hillside, Cresswell limestone at the top of hill, Grant shale poorly exposed below and Stovall limestone at road level at 380 m (1247 ft); one digital photo; approximately 100 ft east of center of west line SW1/4, SW1/4, Sec. 27, T.10S., R.5E., Geary Co., Kansas.

*GE-323 = Winfield (Cresswell limestone) Limestone exposed in field southwest of junction of north-south and east-west roads at 385 m (1263 ft); one digital photo; approximately 400 ft north of center of west line Sec. 27, T.10S., R5E., Geary Co., Kansas.

*GE-324 = Winfield (Cresswell limestone) Limestone exposed in road ditch on east side of road, with base of Cresswell at 383 m (1256 ft); one digital photo; approximately 400 ft north and 200 ft east of center of west line Sec. 22, T.10S., R.5E., Geary Co., Kansas.

*GE-325 = Winfield (Cresswell limestone) Limestone exposed in road ditch on south side of road, with possible base of Cresswell limestone at 385 m (1263 ft); one digital photo; center of north line NW1/4, Sec. 15, T.10S., R.5E., Geary Co., Kansas.

*GE-326 = Base of Winfield (Cresswell limestone) Limestone exposed in drainage on south side of road, with base of Cresswell limestone at 389 m (1276 ft); one digital photo; approximately 300 ft east of center of north line NE1/4, Sec. 15, T.10S., R.5E., Geary Co., Kansas.

*GE-327 = Winfield (Stovall limestone) Limestone exposed in road ditch on west side of road at 385 m (1263 ft); one digital photo; near center of west line of NW1/4, Sec. 14, T.10S., R.5E., Geary Co., Kansas.

*GE-328 = Winfield (Cresswell limestone) Limestone exposed in road ditch on west side of road, with base of Cresswell limestone at 389 m (1276 ft); one digital photo; near center of west line of SW1/4, SW1/4, NW1/4, Sec. 14, T.10S., R.5E., Geary Co., Kansas.

*GE-329 = Winfield (Cresswell limestone and Grant shale) Limestone exposed in quarry [intensely burrowed and fossiliferous (*Derbyia* and *Composita*) beds in the lower Cresswell limestone and upper Grant shale], with base of Cresswell limestone at 385 m (1263 ft); one digital photo; approximately 200 ft east of center of north line of NW1/4, NW1/4, Sec. 22, T.10S., R.5E., Geary Co., Kansas.

*GE-331 = Winfield (Stovall limestone) Limestone exposed in road and road ditch on south side of road at 381 m (1250 ft); one digital photo; center of south line of SE1/4, NE1/4, Sec. 33, T.10S., R.5E., Geary Co., Kansas.

GE-332 = Winfield (Cresswell limestone) Limestone exposed in road and in road ditch on west side of road, with base of Cresswell limestone at 387 m (1270 ft); one digital photo; approximately 150 ft north of center of west line of SW1/4, SW1/4, Sec. 34, T.10S., R.5E., Geary Co., Kansas.

*GE-333 = Winfield (Cresswell limestone and Grant shale) Limestone well exposed in road ditch on south side of road, with base of Cresswell limestone at 390 m (1280 ft); good exposure of fossiliferous and burrowed beds in the lower Cresswell limestone and upper Grant shale; one digital photo; approximately 200 ft east of center of south line of NW1/4, Sec. 34, T.10S., R.5E., Geary Co., Kansas.

*GE-334 = Winfield (Stovall limestone) Limestone exposed in road cut on south side of road at 389 m (1276 ft); one digital photo; approximately 200 ft east of center of south line of SE1/4, SW1/4, Sec. 35, T.10S., R.5E., Geary Co., Kansas.

*GE-335 = Winfield (Stovall limestone, Grant shale, and lower beds of Cresswell limestone)
Limestone exposed in road and road ditches, with base of Cresswell limestone at 392 m (1286 ft); Grant is 2 m (8 ft) thick (hand leveled); one digital photo; center of south line of SW1/4, SW1/4, Sec. 35, T.10S., R.5E., Geary Co., Kansas.

MILFORD DAM QUADRANGLE

Field work was conducted during January–March of 2007.

G-12 = Winfield (Stovall limestone, Grant shale, and Cresswell limestone) Limestone; Sec. 14, T.11S., R.4E., Geary Co., Kansas; measured and described by J. M. Jewett, undated; same as J-55.

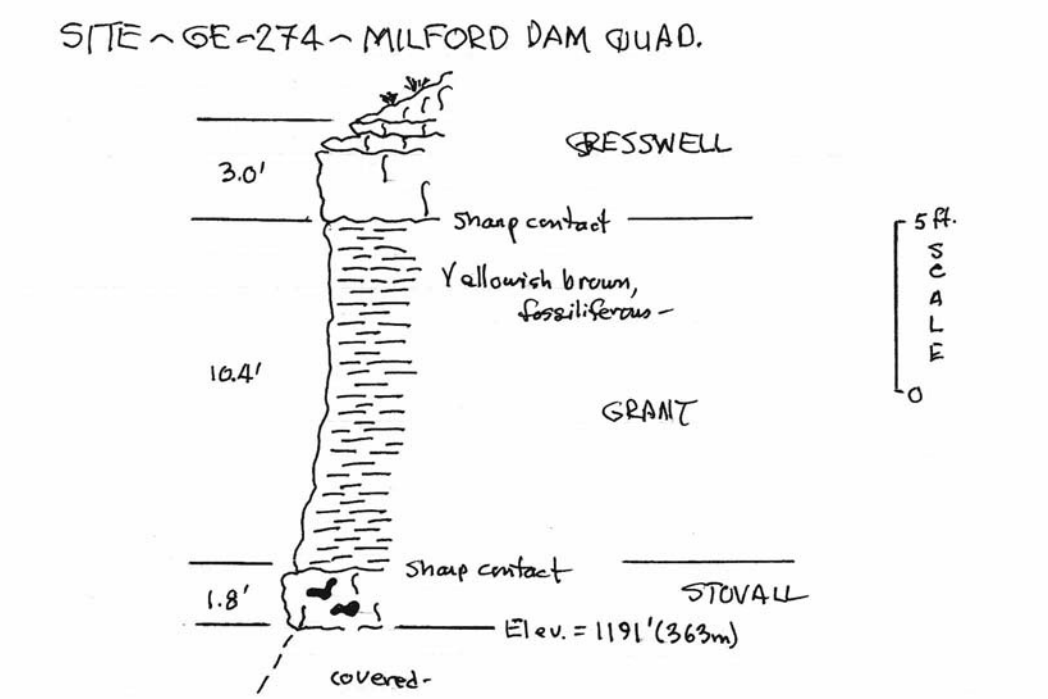
J-55 = Same as G-12.

GE-270 = Doyle (lower beds of Towanda limestone and upper mudrocks of Holmesville shale) Shale exposed along Milford Lake shore, with base of Towanda limestone at 350 m (1148 ft); basal bed like that at GE-269 with laterally discontinuous microbial/algal stromatolites; three digital photos, one of base where stromatolites are absent and two of base where stromatolites are present just southeast of first photo; approximately 400 ft east and 200 ft south of northwest corner Sec. 12, T.11S., R.4E., Geary Co., Kansas.

GE-271 = Winfield (Stovall) Limestone exposed in road cut on north side of Rebecca Road, base of 0.6 m (2.1 ft) thick Stovall limestone at 364 m (1194 ft); three digital photos; approximately 500 ft east of center of south line of Sec. 2, T.11S., R.4E., Geary Co., Kansas.

GE-273 = Doyle (Towanda limestone) Shale exposed along lakeshore, only lower part of Towanda limestone exposed with base at 350 m (1148 ft); one digital photo; approximately 100 ft east of center of S1/2, SW1/4, Sec. 14, T.11S., R.4E., Geary Co., Kansas.

GE-274 = Winfield (Stovall limestone, Grant shale, and lower Cresswell limestone) exposed in road cut on east side of Union Road (Dickinson-Geary Co. line), with base of Stovall limestone at 363 m (1191 ft), see graphic section; five digital photos; center of west line SW1/4, Sec. 2, T.121S., R.4E., Geary Co., Kansas.



Cresswell limestone – weathers light gray, thick to thin bedded limestone with silicified crinoid and echinoid debris.

Grant shale – yellowish brown, fossiliferous (ramose bryozoans, productid brachiopods, *Composita*, *Neochonetes*, crinoid and echinod debris, and fillings of generally horizontal burrows) mudrock.

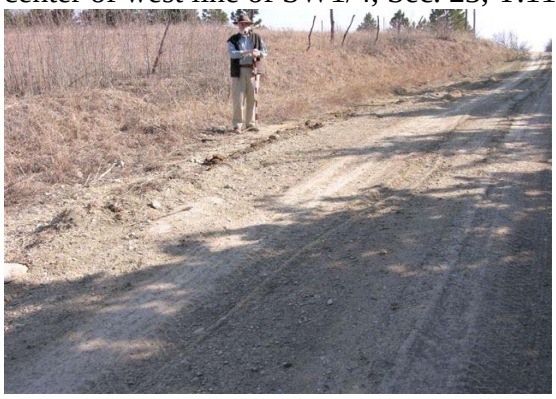
Stovall limestone – light gray (fresh) to medium gray (weathered) cherty, fossiliferous (disarticulated myalinids and productids, *Wilkingia* in life position) limestone; chert is light to medium and dark gray (fresh) with a light yellowish brown weathered rind.

GE-275 = Winfield (upper mudrocks of Grant shale and lower beds of Cresswell limestone) Limestone exposed in road cuts on both sides of Union Road (Dickinson-Geary Co. line), Cresswell limestone is 1.1 m (3.6 ft) thick with base at 370 m (1214 ft); two digital photos; center west line NW1/4, NW1/4, Sec. 11, T.11S., R.4E., Geary Co., Kansas.

GE-276 = Winfield (upper mudrocks of Grant shale and lower beds of Cresswell limestone) Limestone exposed in road cuts on both sides of Union Road (Dickinson-Geary Co. line), with base of Cresswell limestone at 370 m (1214 ft); one digital photo; approximately 400 ft south of northwest corner SW1/4, Sec. 11. T.11S., R.4E., Geary Co., Kansas.

GE-277 = Nolans (Krider limestone) Limestone exposed in road cuts on both sides of Union Road (Dickinson-Geary Co. line), at 385 m (1263 ft), base and top covered; two digital photos, one on each side of road; approximately 100 ft north of southwest corner NW1/4, SW1/4, Sec.11, T.11S., R.4E., Geary Co., Kansas.

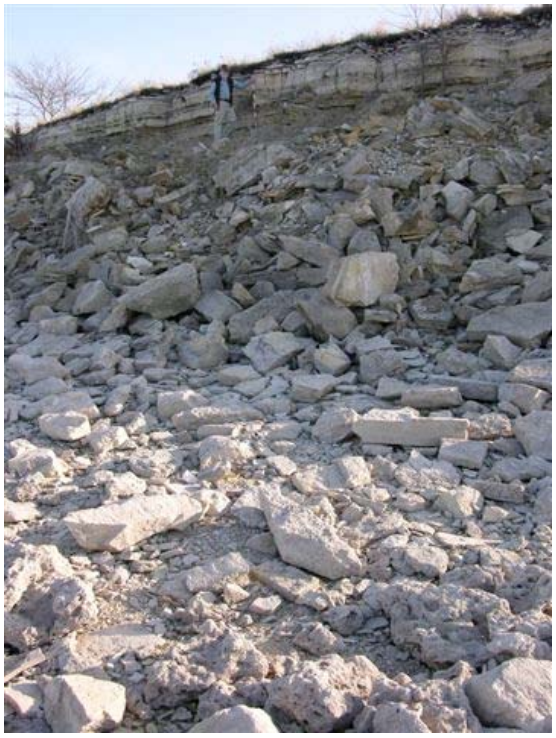
GE-278 = Winfield (Stovall limestone, covered Grant shale, and lower beds of Cresswell limestone) Limestone exposed in road cut on east side of Union Road (Dickinson-Geary Co. line), with top of Stovall limestone at 365 m (1197 ft); one digital photo; center of west line of SW1/4, Sec. 23, T.11S., R.4E., Geary Co., Kansas.



GE-279 = Doyle (Towanda limestone and Holmesville shale) Shale exposed along lake shore, with base of Towanda limestone at 349 m (1145 ft); stromatolitic bed at base of Towanda limestone is poorly developed; thin-bedded, dense limestones in upper Towanda contain abundant bivalve molds, *Permorphorus*, some are butterflied indicating rapid burial; 2.5 m (+8.2 ft) of Towanda limestone and 2.3 m (7.5 ft) of yellowish-brown, grayish-green, and maroon mudrocks of upper Holmesville shale; two digital photos; center of NW1/4, SW1/4, Sec. 24, T.11S., R.4E., Geary Co., KS .

GE-280 = Winfield (Stovall limestone, Grant shale, and Cresswell limestone) Limestone exposed in road cuts on both sides of Union Road (Dickinson-Geary Co. line), Grant shale and Cresswell limestone are exposed on both sides of the road with the best exposure on the west side, Stovall limestone poorly exposed on east side of road with top at 365 m (1197 ft); two digital photos; approximately 200 ft south of center of west line, SW1/4, SW1/4, Sec. 26, T.11S., R.4E., Geary Co. Kansas.

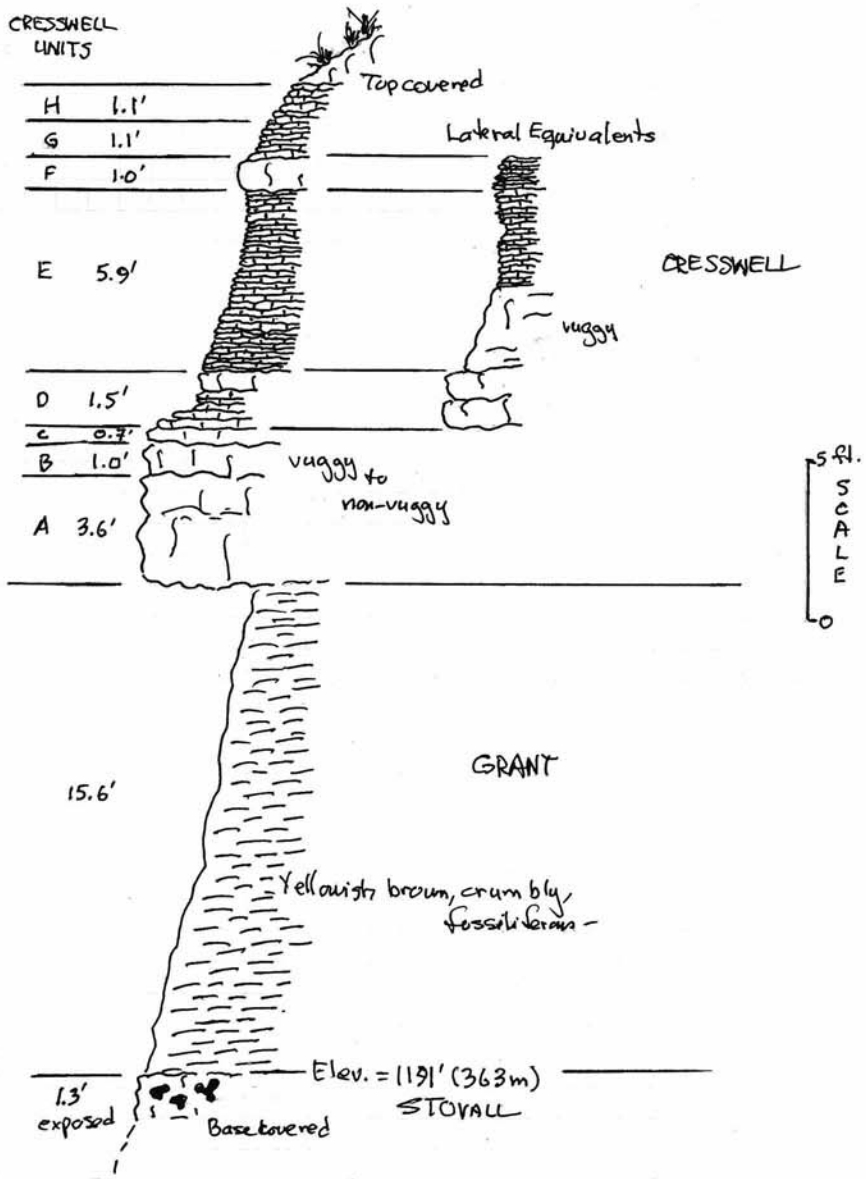
GE-281 = Barneston (upper beds of Fort Riley limestone and Doyle (Holmesville shale and Towanda limestone) Shale exposed along lake shore, 2 m (±6.5 ft) of upper Fort Riley limestone, 4 m (±13.6 ft) of Holmesville shale, and 1.6 m (5.4 ft) of Towanda limestone with base of Towanda limestone at 349 m (1145 ft); one digital photo; approximately 200 ft west of center of SE1/4, Sec. 24, T.11S., R.4E., Geary Co., Kansas.



Dickinson County Reference Section – Winfield Limestone

DK-1 = Winfield (Stovall limestone, Grant shale, and Cresswell limestone) Limestone exposed in road cuts along both sides (northwest and southeast) of Union Road, with top of Stovall limestone at 363 m (1191 ft), see graphic section; eleven digital photos; near center NE1/4, NW1/4, NW1/4, Sec. 15, T.11S., R.4E., Dickinson Co., Kansas.

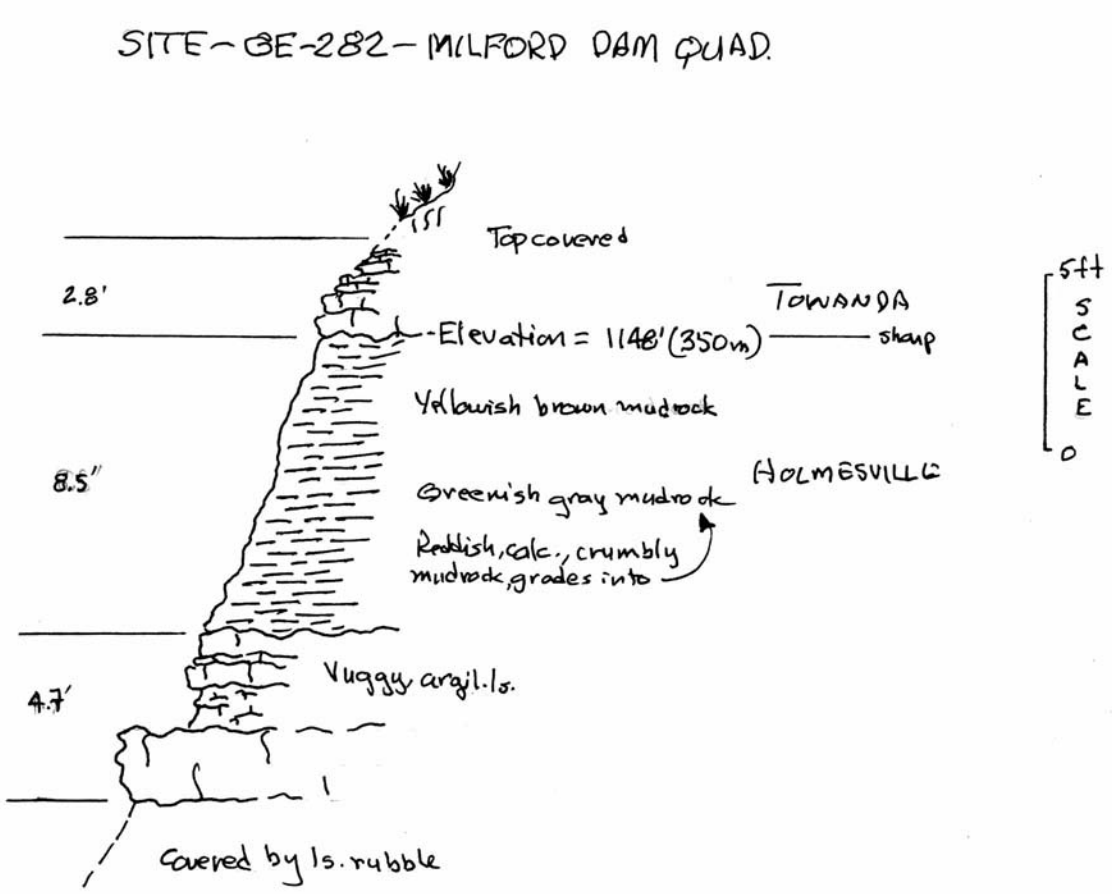
SITE ~ OK-1 - MILFORD DAM QUAD ~ WINFIELD LS. REFERENCE SEC.



CRESSWELL LIMESTONE UNITS

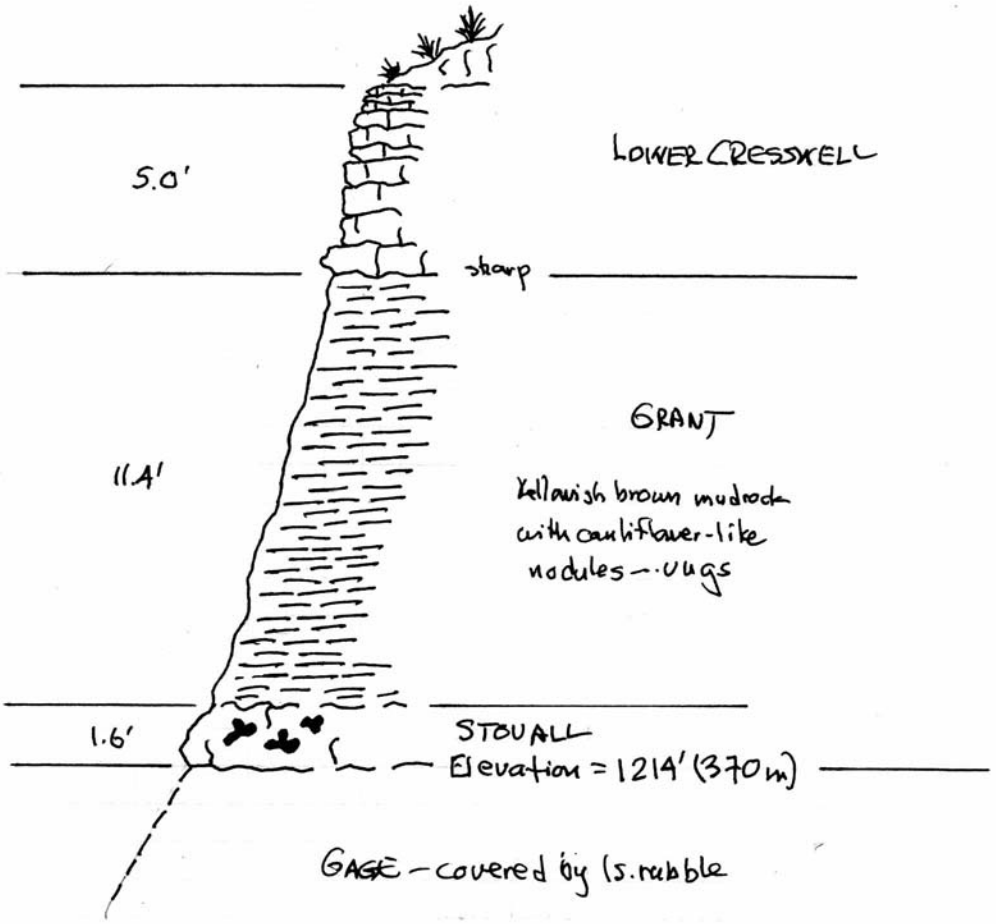
A = yellowish brown to medium gray fossiliferous (brachiopods and crinoid and echinoid debris) limestone with a few small vugs in the upper part.
B = like unit A except that the vugs are more numerous and larger and reddish brown, no fossils observed.
C = medium gray, thin bedded limestone.
D = thin to medium beds of light yellowish brown, finely laminated limestone that becomes platy and "slabby" when weathered, lateral equivalent is two medium beds.
E = similar to unit D, becomes a "dirty" white (chalky), very platy, "slabby" limestone, lateral equivalent is a thick to medium bed of limestone overlain by platy limestone.
F = similar to unit D, a medium bed of limestone that upon weathering becomes platy and "slabby".
G = light greenish gray, thin bedded limestone.
H = light greenish gray, slightly thicker bedded limestone than unit G.

GE-282 = Barneston (upper beds of Fort Riley) Limestone and Doyle (Holmesville shale and lower Towanda limestone) Shale exposed along lake shore, with base of Towanda limestone at 350 m (1148 ft), see graphic section; one digital photo; approximately 200 ft south and 100 ft west of center, SE1/4, NW1/4, Sec. 25, T.11S., R.4E., Geary Co., Kansas.



GE-283 = Doyle (Gage shale) Shale (mostly covered) and Winfield (lower beds of Cresswell limestone, Grant shale, and Stovall limestone) Limestone exposed in road cuts on both sides of Kansas Highway 244, with base of Stovall limestone at 370 m (1214 ft); see graphic section; two digital photos of the exposure on the north side of Kansas Highway 244; approximately 200 ft north and 100 ft west of center of south line, SE1/4, SW1/4, Sec. 25, T.11S., R.4E., Geary Co., Kansas.

SITE ~ GE-283 – MILFORD DAM QUAD.



Stovall is poorly exposed by chert rubble is abundant and a bit of digging exposes it.

GE-284 = Doyle (Gage shale) Shale and Winfield (Stovall limestone and lower Grant shale) Limestone exposed in road cuts on both sides of Kansas Highway 244, with base of the Stovall limestone at 375 m (1230 ft) on the north side of highway; Gage shale contains a thin limestone bed approximately 2 m (6 ft) below base of Winfield (Stovall limestone) Limestone; one digital photo of the base of the Stovall limestone; approximately 200 ft north and 200 ft west of center of south line SW1/4, Sec. 30, T.11S., R.5E., Geary Co., Kansas.

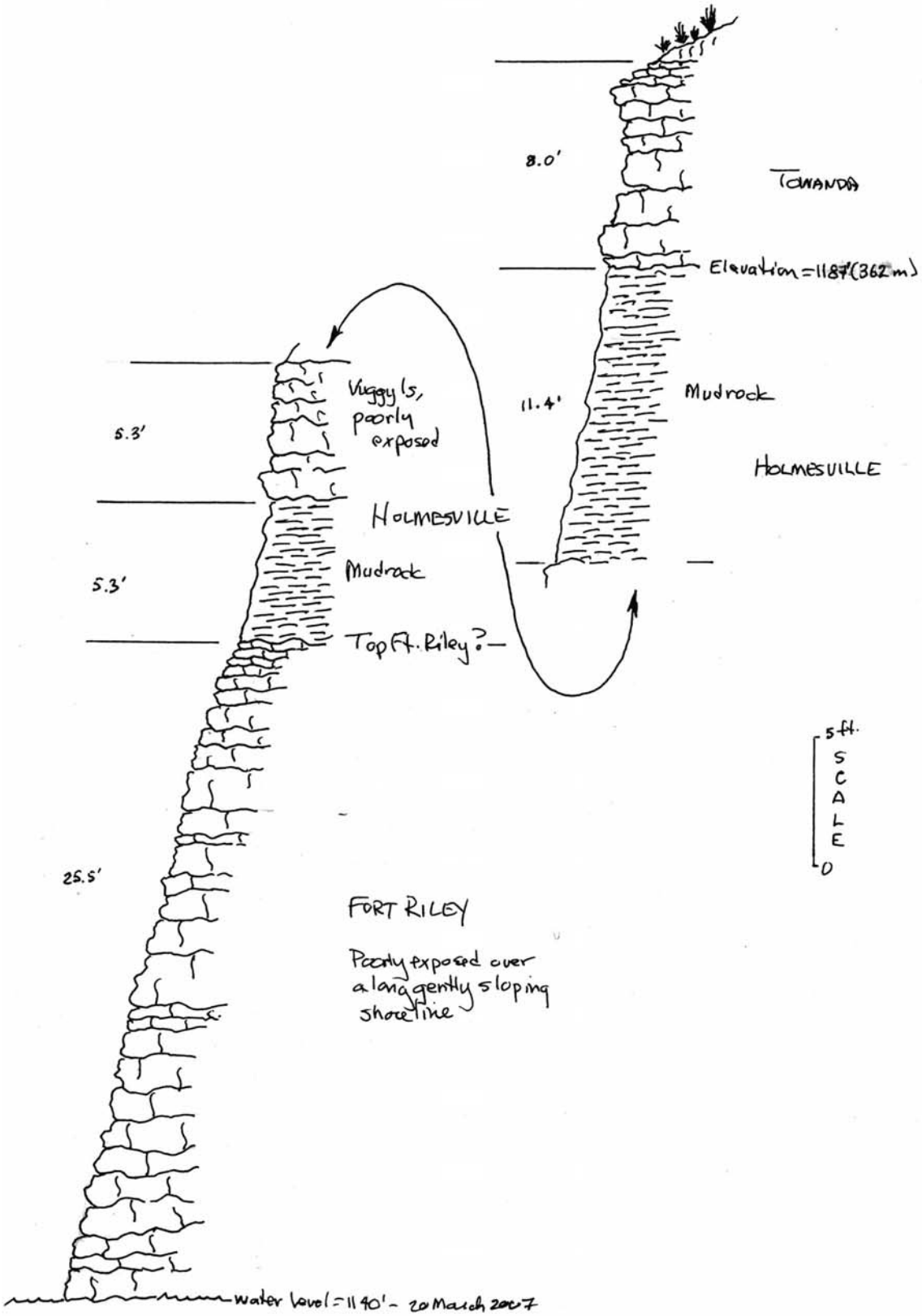
GE-285 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in the Milford Lake Spillway, with top of "rim rock" at 349 m (1145 ft), see graphic and described section in Miller and Twiss, 1994; two digital photos; approximately 300 ft south and 100 ft west of center, Sec. 29, T.11S., R.5E., Geary Co., Kansas.

Milford Lake Spillway – Photo of the upper Florence limestone, Oketo shale, and Fort Riley limestone "rim rock" about half way between GE-285 and GE-286.

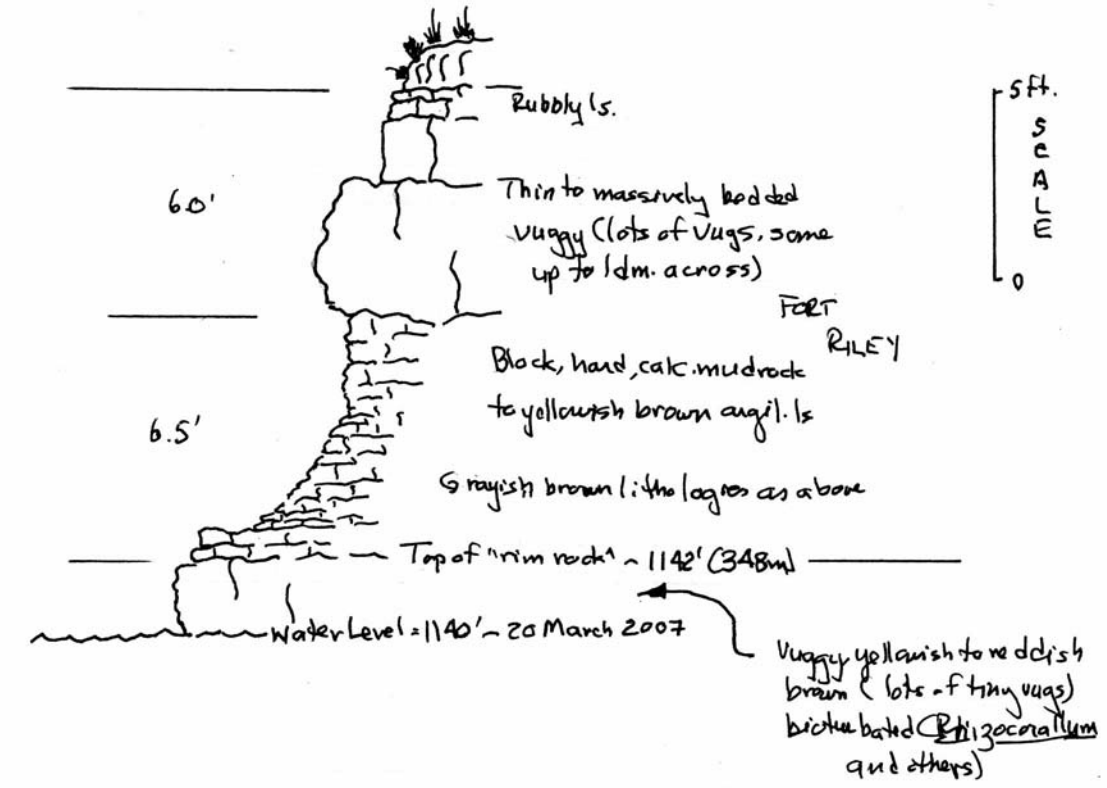
GE-286 = Matfield (upper Blue Springs) Shale and Barneston (Florence limestone) Limestone exposed in Milford Lake Spillway, with base of Florence limestone at 336 m (1102 ft), see graphic and described section in Miller and Twiss, 1994; two digital photos; approximately 500 ft east of center of Sec. 29, T.11S., R.5E., Geary Co., Kansas.

GE-287 = Doyle (lower Towanda limestone and Holmesville shale) Shale exposed in a road cut on the northwest side of Kansas Highway 244 Spur, with base of Towanda limestone at 365 m (1197 ft); 3 m (10.8 ft) of Holmesville shale above a vuggy limestone in Holmesville shale and below Towanda limestone; one digital photo; approximately 500 ft north of center of Sec. 29, T.11S., R.5E., Geary Co., Kansas.

GE-288 = Barneston (Fort Riley limestone) Limestone and Doyle (Holmesville shale and lower Towanda limestone) Shale exposed along lake shore, with base of Towanda limestone at 362 m (1187 ft), see graphic section; one digital photo; approximately 400 ft west and 200 ft south of center of northeast corner Sec. 30, T.11S., R.5E., Geary Co., Kansas.


SITE~GE~288~MILFORD DAM QUAD.
8.0'
TONANDA
Elevation=1187'(362m)
11.4'
Mudrock
HOLMESVILLE
Vuggy ls, poorly exposed
5.3'
HOLMESVILLE
Mudrock
5.3'
Top Ft. Riley?
5ft.
SCALE
0
25.5'
FORT RILEY
Poorly exposed over a long gently sloping shoreline
water level=1140'- 20 March 2007

GE-289 = Barneston (Fort Riley limestone) Limestone exposed along lake shore at south end of Milford Lake dam near gauging station, with top of "rim rock" at 348 m (1142 ft); see graphic section; one digital photo; approximately 200 ft north and 100 ft west of center of SW1/4, SW1/4, Sec. 20, T.11S., R.5E., Geary Co., Kansas.



NOTE: Lake water level was 347 m (1140 ft); normal water level is 440 m (1444 ft) according to the U.S. Army Corps of Engineers office at Milford Lake.

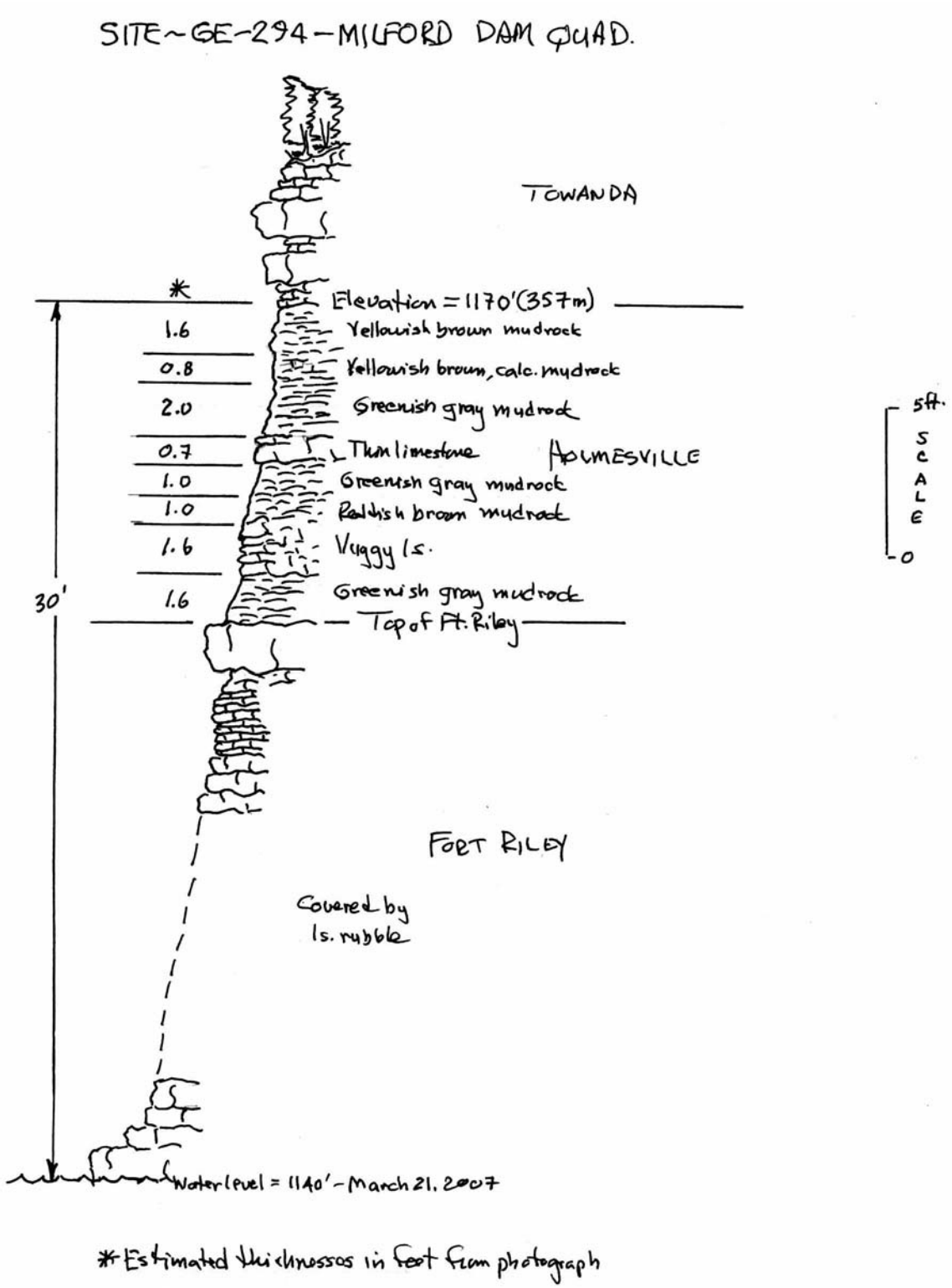
GE-290 = Matfield (Blue Springs shale) Shale and lower Barneston (Florence limestone) Limestone exposed at north end of road below Milford Lake dam in south-facing bluff, with base of Florence limestone at 335 m (1165 ft); see geologic column in Milford Lake construction area report (U.S. Army Corps of Engineers (undated); one digital photo; approximately 200 ft west and 100 ft south of center of S1/2, SE1/4, Sec. 17, T.11S., R.5E., Geary Co., Kansas.

GE-291 = Barneston (Florence limestone, Oketo shale, and Fort Riley limestone) Limestone exposed in road cuts on both sides of road to fish hatchery at south end of Milford Lake dam, just above and south of outlet tubes, with top of "rim rock" at 348 m (1142 ft); section 12 of Griffin (1974); two digital photos of exposure on southwest side of road; approximately 300 ft west and 100 ft north of center of SW1/4, SE1/4, Sec. 20, T.11S., R.5E., Geary Co., Kansas.

GE-292 = Doyle (Towanda limestone) Shale poorly exposed in road bank on east side of road, with base of Towanda limestone at 360 m (1181 ft); one digital photo; near center of NW1/4, NE1/4, Sec. 8, T.11S., R.5E., Geary Co., Kansas.

GE-293 = Doyle (Towanda limestone) Shale exposed in hillside on southwest side of road, with base of Towanda limestone at 356 m (1168 ft); one digital photo; approximately 200 ft south of center of north line NE1/4, SW1/4, Sec. 8, T.11S., R.5E., Geary Co., Kansas.

GE-294 = Barneston (upper Fort Riley limestone) Limestone and Doyle (Holmesville shale and lower Towanda limestone) Limestone exposed along lake shore on east side of Milford Lake. With the base of Towanda limestone 9 m (30 ft) above water level [based on a water level of 347 m (1140 ft)], the base of Towanda limestone is at 357 m (1170 ft); see graphic section; three digital photos; approximately 300 ft south and 100 ft east of center of S1/2, Sec. 7, T.11S., R.5E., Geary Co., Kansas.



NOTE: At this site there are two limestones in the Holmesville shale; the thicker, vuggy limestone with reddish and greenish-gray mudrock above is common. The thin bed of dense, light-yellow to greenish-gray limestone has been seen only one other locality.

GE-296 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in road ditch on west side of road, with “rim rock” at 351 m (1152 ft); one digital photo; approximately 200 ft north and 200 ft west of southeast corner, NE1/4, SE1/4, SW1/4, Sec. 16, T.11S., R.5E., Geary Co., Kansas.

GE-297 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in road ditch on southwest side of Walla Walla Road, with “rim rock” at 353 m (1158 ft); one digital photo; near northeast corner NW1/4, NW1/4, Sec. 33, T.11S., R.5E., Geary Co., Kansas.

GE-298 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Munson Road N, with base of Towanda limestone at 368 m (1207 ft); one digital photo of exposure on east side of road; center west line SW1/4, SW1/4, Sec. 9, T.12S., R.5E., Geary Co., Kansas.

GE-299 = Doyle (Towanda limestone) Shale well exposed in road cut on south side of West Rucker Road, with base of Towanda limestone at 368 m (1207 ft); two digital photos; approximately 200 ft west of northeast corner Sec. 5, T.12S., R.5E., Geary Co., Kansas.

GE-300 = Winfield (Stovall limestone) Limestone exposed in road cut on Liberty Hall Road, with Stovall limestone at 386 m (1266 ft); two digital photos, one on each side of road; approximately 200 ft east of southwest corner SW1/4, SE1/4, SW1/4, Sec. 9, T.12S., R.5E., Geary Co., Kansas.

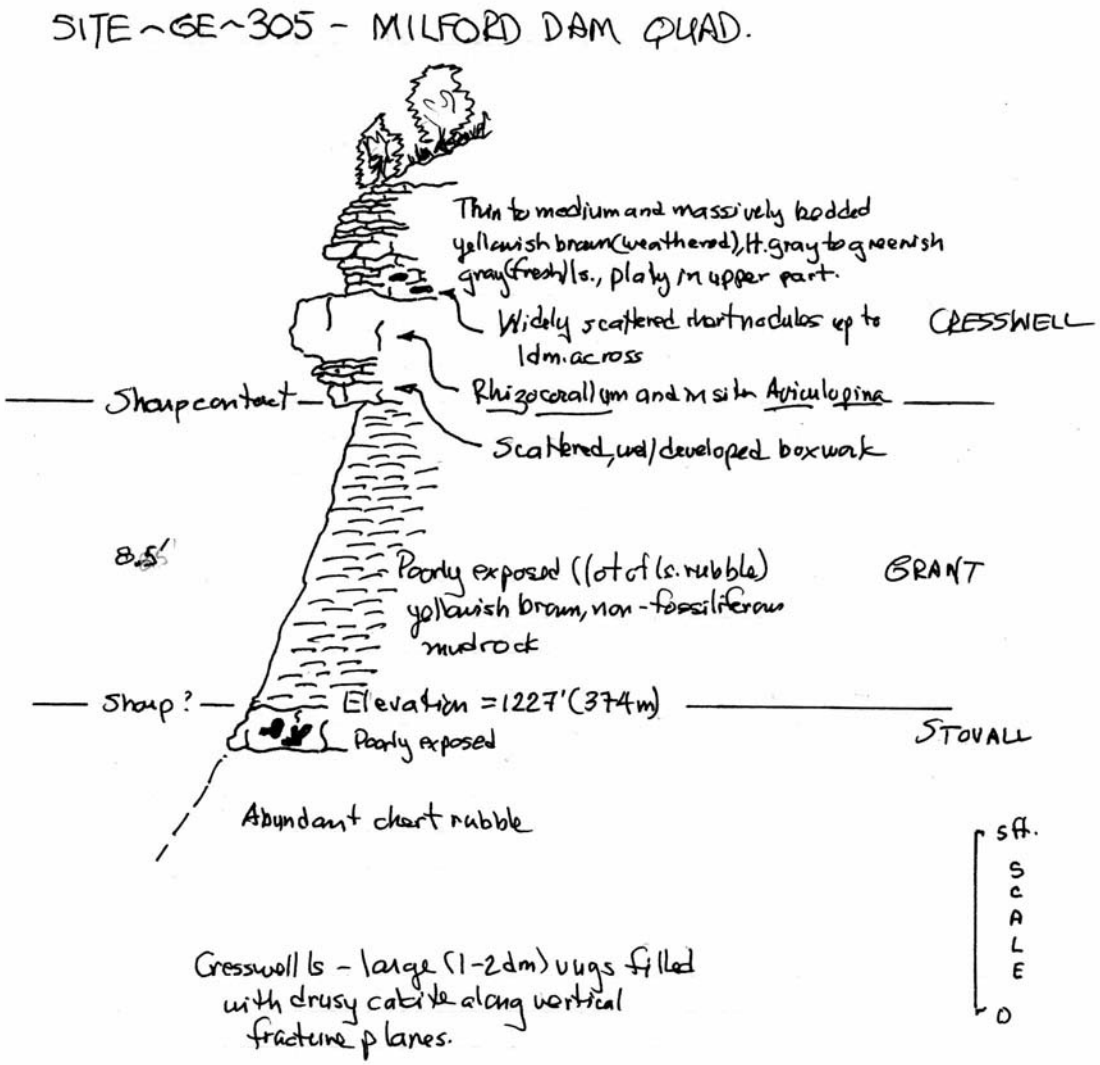
GE-301 = Doyle (lower Towanda limestone) Shale exposed in road cuts on both sides of Liberty Hall Road, with base of Towanda limestone at 365 m (1197 ft); one digital photo of exposure on north side of road; approximately 500 ft east of southwest corner Sec. 7, T.12S., R.5E., Geary Co., Kansas.

GE-302 = Winfield (Cresswell) Limestone exposed in road cut on west side of Gefeller Road N, with base of Cresswell limestone at 381 m (1250 ft) in the road ditch; two digital photos; near center of east line Sec. 6, T.12S., R.5E., Geary Co., Kansas.

GE-303 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Liberty Hall Road, with base of Towanda limestone at 358 m (1175 ft) on the south side of road; one digital photo; near center of south line Sec. 12, T.12S., R.5E., Geary Co., Kansas.

GE-304 = Winfield (Stovall limestone) Limestone exposed in road ditch on south side of Liberty Hall Road, with base of Stovall limestone at 373 m (1224 ft); one digital photo; near center of south line SW1/4, SW1/4, Sec. 13, T.12S., R.5E., Geary Co., Kansas.

GE-305 = Winfield Limestone well exposed on east side of Milford Lake Road, with top of the Stovall limestone at 374 m (1227 ft), see graphic section; three digital photos, one of Stovall, limestone a close-up of cherty beds in Cresswell limestone, and one of the entire exposure; near center of west line NW1/4, NW1/4, Sec. 13, T.12S., R.5E., Geary Co., Kansas.



GE-306 = Nolans (Krider limestone) Limestone poorly exposed on east side of Dietrich/Union Road (Geary-Dickinson county line) at 390 m (1279 ft); one digital photo; approximately 100 ft north of center of west line NW1/4, Sec. 11, T.12S., R.4E., Geary Co., Kansas.

GE-307 = Winfield (Cresswell limestone) Limestone exposed in road cuts on both sides of Kansas Highway 18, with base of Cresswell limestone at 375 m (1230 ft); discontinuous bed (approximately 1 dm thick) of chert in the Cresswell limestone about 1 m above base; three digital photos; approximately 250 ft east of center of north line Sec. 11. T.12S., R.4E., Geary Co., Kansas.

GE-308 = Nolans (Krider limestone) Limestone exposed in road cut on West Rucker Road at 387 m (1270 ft); limestone is yellowish brown; one digital photo; near center of north line Sec. 2, T.12S., R.4E., Geary Co., Kansas.

Supplemental Site (Point H does not have GPS coordinates or photographs)

Point H = Lake shore exposure like that at GE-282, but Towanda limestone and Holmesville shale are thicker here with what might be upper beds of Fort Riley limestone below; approximately 300 ft south of center of north line, NW1/4, NE1/4, Sec. 25, T.11S., R.4E., Geary Co., Kansas.

JUNCTION CITY QUADRANGLE

Field work was conducted during January–March of 2007.

G-5 = Sequence from upper Wreford (Schroyer limestone) Limestone to Doyle (Holmesville shale) Shale (present understanding would identify this sequence as being from mudrocks in the Speiser Shale to the Towanda limestone) one mile east of Junction City, Kansas; near center of NW1/4, SE1/4, Sec. 7, T.12S., R.6E., Geary Co., Kansas; measured and described by Elias in 1932; same as J-66.

G-6 = same as G-5 = J-66.

G-7 = Sequence from Crouse Limestone just above water level in Smoky Hill River to Doyle (Towanda limestone) Shale; near center, Sec. 7, T.12S., R.6E., Geary Co., Kansas; probably measured by Jewett based on the style of the graphics, undated.

G-8 = Sequence from upper Barneston (Fort Riley limestone) Limestone to Doyle (Towanda limestone) Shale, 2 miles west of Junction City, Kansas on U.S. Highway 40; southeast corner Sec. 15, T.12S., R.5E., Geary Co., Kansas; measured and described by Elias in 1932; same as J-65.

G-9 = Sequence from Barneston (Florence limestone into the Fort Riley limestone) Limestone at Walker Cut Stone Co.; just southwest of the center of NW1/4, Sec. 10, T.12S., R.5E., Geary Co., Kansas; measured and described by Ives in 1953.

G-14 = Sequence from the Wreford (Havensville shale) Limestone into Barneston (Fort Riley limestone) Limestone; Sec. 9, T.12S., R.6E., Geary Co., Kansas; measured by Jewett, 1930; same as J-67.

G-16 = Sequence from Matfield (Wymore shale into the Blue Springs shale) Shale in spur of upland southeast (this locality is southwest of Junction City, Kansas; Sec. 15, T.12S., R.5E., Geary Co., Kansas); measured and described by Condra and Upp, 1931 (section 15, p. 39).

G-18 = Wreford Limestone, sequence from Fourmile limestone (now Threemile limestone) into Schroyer limestone in spur of upland southeast of Junction City, Kansas; Sec.12, T. 12S., R.5E., Geary Co., Kansas; measured, described, and published by Condra and Upp, 1931 (section 12, p. 35).

G-19 = Sequence and descriptions of lithologies suggest interval from the Matfield (upper Wymore shale) Shale into upper Barneston (Fort Riley limestone) Limestone; section at mill by bridge over Smoky Hill River a little south and east of Junction City, Kansas; Sec. 7, T.12S., R.6E., Geary Co., Kansas; measured, described, and published by Sellards and Beede, 1905 (p. 93-94).

J-56 = Sequence from Matfield (upper Wymore shale) Shale to Doyle (Towanda limestone) Shale exposed in Sec. 22, T.11S., R.5E., Geary Co., Kansas.

J-65 = Same as G-8.

J-66 = Same as G-5 and G-6.

J-67 = Same as G-14.

GE-82 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on north side of Junction Road, with base of Florence limestone at 378 m (1240 ft); one digital photo; near center of south line Sec. 10, T.12S., R.6E., Geary Co., Kansas.

GE-217 = Barneston (Fort Riley limestone "rim rock", Oketo shale, and upper Florence limestone) Limestone exposed in road cut on south side of Junction Road, with base of "rim rock" at 390 m (1280 ft), Oketo shale is very thin here; one digital photo; approximately 150 ft west of center of north line NE1/4, NW1/4, Sec. 15, T.12S., R.6E., Geary Co., Kansas.

GE-218 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on southwest side of Kansas Highway 57, with base of “rim rock” at 390 m (1280 ft); one digital photo; northwest of center of SE1/4, NE1/4, NW1/4, Sec. 15, T.12S., R.6E., Geary Co., Kansas.

GE-219 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on north side of Kansas Highway 57 at Franks Hill, with base of “rim rock” at 384 m (1260 ft); one digital photo; near center of west line SW1/4, NE1/4, NW1/4, Sec. 9, T.12S., R.6E, Geary Co., Kansas; location of the Fort Riley limestone recorded in G-14 and J-67. Griffin, 1974 (measured section 13) described 4.34 m (14 ft) of Oketo shale in SE1/4, NW1/4, Sec. 9, T.12S., R.6E., Geary Co., Kansas, in a road cut on the north side of Kansas Highway 57, 0.5 miles southeast of intersection of Kansas Highway 57 and Interstate Highway 70.

GE-220 = Barneston (Florence limestone) Limestone exposed in road cut on north side of Kansas Highway 57 at Franks Hill, with base of Florence limestone at 372 m (1220 ft); one digital photo; near center of NW1/4, NW1/4, Sec. 9, T.12S., R.6E., Geary Co., Kansas; location of Florence limestone recorded in G-14 and J-67.

GE-221 = Matfield (Kinney limestone and upper Wymore shale) Shale well exposed at small parking area on northeast side of Kansas Highway 57 at Franks Hill, with base of Kinney limestone at 357 m (1171 ft); one digital photo; just west of center of south line of NE1/4, NE1/4, NE1/4, Sec. 8, T.12S., R6E., Geary Co., Kansas; location of Kinney limestone recorded in G-14 and J-67.

GE-222 = Wreford (Schroyer limestone) Limestone exposed in road cuts on both sides of Kansas Highway 57 just south and east of a roadside park, with the top of Schroyer limestone at 350 m (1148 ft); one digital photo of exposure on northeast side of highway; just south and west of center of north line of NE1/4, NE1/4, Sec. 8, T.12S., R.6E., Geary Co., Kansas; location of Schroyer limestone recorded in G-14 and J-67. GE-222 and GE-221 are probably section 221 of Mazzullo et al. (1997) which they apparently mis-located in Sec. 9. Their location is described as "Roadcut on Frank's (sic) Hill, N/2, sec. 9, T. 12S., R.6E., Geary County, Texas (sic)".

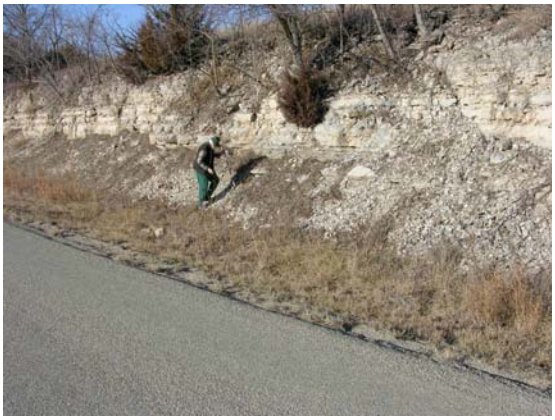
GE-223 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in hillside at Freedom Park, with the base of "rim rock" at 386 m (1266 ft); lower down the slope the approximate top of the upper Wreford (Schroyer limestone) Limestone is at 350 m (1148 ft); two digital photos, one close-up and one wide-angle; near center of SE1/4, SE1/4, NE1/4, Sec. 4, T.12S., R.6E., Geary Co., Kansas.

GE-224 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cuts on both sides of Kansas Highway 57 and Alternate U.S. Highway 40 on the east side of bridge over Smoky Hill River; base of Threemile limestone is best exposed on north side of highway at 335 m (1099 ft); two digital photos, one on south side of highway and one on north side; just north and west of east line of NW1/4, NE1/4, Sec. 7, T.12S., R.6E., Geary Co., Kansas.

GE-225 = Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale, Kinney limestone, and Wymore shale) Shale exposed in road cut on south side of Interstate Highway 70, with base of Florence limestone at 370 m (1214 ft); one digital photo taken from north side of I-70; approximately 150 ft south and 300 ft west of the center of east line of NW1/4, NW1/4, Sec. 8, T.12S., R.6E., Geary Co., Kansas.

GE-226 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both sides of Old Stage Road, with base of “rim rock” at 378 m (1240 ft); one digital photo; near center of S1/2, NW1/4, Sec. 17, T.12S., R.6E., Geary Co., Kansas.

GE-227 = Barneston (Florence limestone) Limestone exposed in road cut on northeast side of Old Stage Road, with base of Florence limestone at 367 m (1204 ft); one digital photo; near center of west line of NE1/4, NE1/4, NE1/4, Sec. 18, T.12S., R.6E., Geary Co., Kansas.



GE-228 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on southeast side of J Hill Road, with base of “rim rock” at 377 m (1237 ft); one digital photo; approximately 200 ft east and 300 ft north of center of south line SW1/4, SE1/4, Sec. 7, T.12S., R.6E., Geary Co., Kansas. This is the general area of sections G-5, G-6, G-7, and J-66.

GE-229 = Barneston (Florence limestone) Limestone exposed in road cut on northeast side of Old Stage Road, with base of Florence limestone at 365 m (1197 ft); one digital photo; near center of SW1/4, SE1/4, NE1/4, Sec. 7, T.12S., R.6E., Geary Co., Kansas. About 0.2 miles southeast of the probable location of G-19.

GE-230 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in new home development on west side of Webster Avenue in Junction City, Kansas, with base of “rim rock” at 370 m (1214 ft); one digital photo; just south of center of N1/2, NE1/4, Sec 14, T.12S., R.5E., Geary Co., Kansas.

GE-231 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on west side of Webster Avenue in Junction City, Kansas, with base of Florence limestone at 358 m (1174 ft); one digital photo; approximately 100 ft east of center of NE1/4, Sec. 14, T.12S., R.5E., Geary Co., Kansas. According to Chaplin (1988) the type locality of the Fort Riley limestone is 0.25 miles southeast of GE-231.

GE-232 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed on south side of visitors parking lot at Geary Co. Unified Schools – Mary E. Devin Center for Education Support at 123 N. Eisenhower Street in Junction City, Kansas, with base of “rim rock” at 370 m (1214 ft); one digital photo; approximately 200 ft north and 100 ft east of center of W1/2, sec. 11, T.12S., R.5E., Geary Co., Kansas.

GE-233 = Barneston (Florence limestone, Oketo shale, and Fort Riley limestone “rim rock”) Limestone well exposed on north side of new reroute of old U.S. Highway 40 on south side of The Bluffs housing development in Junction City, Kansas, with base of “rim rock” at 365 m (1197 ft); one digital photo; approximately 100 ft west of center of SW1/4, SE1/4, Sec. 15, T.12S., R.5E., Geary Co., Kansas.

GE-234 = Matfield (Blue Springs shale) Shale and Barneston (Florence limestone) Limestone well exposed on east side of new reroute of old U.S. Highway 40, south and east of GE-233, with base of Florence limestone at 352 m (1155 ft); one digital photo; near center of south line of SE1/4, Sec. 15, T.12S., R.5E., Geary Co., Kansas. NOTE: G-8 (J-65) reported the sequence from the Fort Riley limestone to the Towanda limestone 0.25 miles due east of this site. Sections G-16 (Matfield Shale), section 3 of Griffin (1974) (Oketo shale), and section 13 of Miller (1992) (Barneston Limestone) are within Sec. 15, T.12S., R.5E., Geary Co., Kansas.

GE-235 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in an old quarry now being developed for housing on east side of Spring Valley Road in western Junction City, Kansas, with base of “rim rock” at 360 m (1181 ft); one digital photo; near center of south line of NW1/4, NW1/4, Sec. 10, T.12S., R.5E., Geary Co., Kansas. This is close to location given for G-9 that reports an excellent exposure of Barneston Limestone at the Walker Cut Stone Co. quarries.

GE-236 = Barneston (Fort Riley limestone “rim rock” and upper Oketo shale) Limestone well exposed in road cuts on both sides of 6th Street in Junction City, Kansas, just east of entrance to Country Club and Welcome to Junction City sign, with base of “rim rock” at 363 m (1191 ft); one digital photo; approximately 250 ft west of southeast corner Sec. 3, T.12S., R.5E., Geary Co., Kansas.

GE-237 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on west side of Oakridge Drive in an old quarry, with base of “rim rock” at 360 m (1181 ft); one digital photo; near center of NE1/4, Sec. 10, T.12S., R.5E., Geary Co., Kansas.

GE-238 = Barneston (Fort Riley limestone “rim rock” and upper Oketo shale) Limestone well exposed in road cuts on both sides of intersection of U.S. Highway 77 and Kansas Highway 18 (also 6th Street in Junction City), with base of “rim rock” on southwest side of southwest ramp of intersection at 362 m (1188 ft); one digital photo; just south of center of NW1/4, NE1/4, NW1/4, Sec. 10, T.12S. R.5E., Geary Co., Kansas. This is also the location of Griffin’s (1974) measured section 11.

GE-239 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on east side of Spring Valley Road in western part of Junction City, Kansas, with base of “rim rock” at 360 m (1181 ft); one digital photo; near center of west line of SW1/4, SW1/4, Sec. 3, T.12S., R.5E., Geary Co., Kansas.

GE-240 = Matfield (upper Blue Springs shale) Shale and lower Barneston (Florence limestone) Limestone well exposed in hillside on west side of Custer Road just north of intersection of Custer Road and Marshall Drive in Westwood area of Junction City, Kansas, with base of Florence limestone at 348 m (1142 ft); one digital photo; 0.15 miles north of southeast corner Sec. 34, T.11S. R.5E., Geary Co., Kansas.

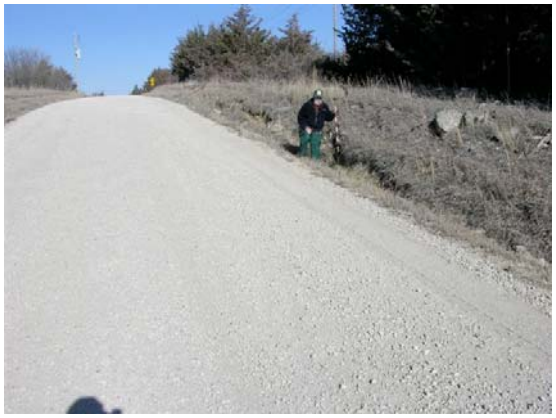
GE-241 = Barneston (Fort Riley limestone "rim rock") Limestone well exposed in road cut on east side of Thompson Road, with base of "rim rock" at 361 m (1184 ft); one digital photo; approximately 200 ft east and 150 ft south of center Sec. 3, T.12S., R.5E., Geary Co., Kansas.

GE-242 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on east side of Thompson Road just north of intersection with Westwood Blvd., with base of Florence limestone at 350 m (1333 ft); one digital photo; approx. 1150 ft southeast of center Sec. 3, T.12S., R.5E., Geary Co., Kansas.

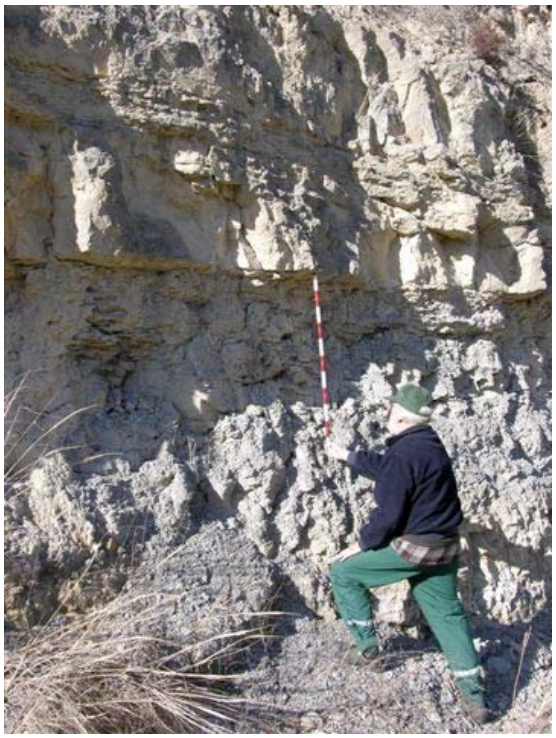
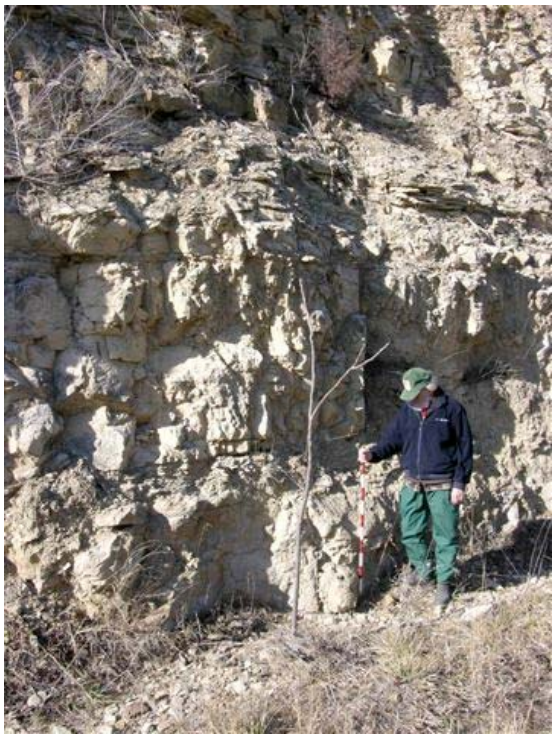
GE-243 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in road cut on east side of U.S. Highway 77 and Kansas Highway 18, with base of "rim rock" at 361 m (1184 ft); one digital photo; near center of N1/2, SW1/4, sec. 3, T.12S., R.5E., Geary Co., Kansas.

GE-244 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on northwest side of Walla Walla Road, with base of “rim rock” at 356 m (1197 ft); one digital photo; approximately 250 ft south of center of north line of NE1/4, NE1/4, Sec. 33, T.11S., R.5E., Geary Co., Kansas.

GE-245 = Doyle (Towanda limestone) Shale exposed in road ditch on east side of Walla Walla Road, with base of Towanda limestone at 373 m (1224 ft); one digital photo; near center of west line of Sec. 34, T.11S., R.5E., Geary Co., Kansas. Sequence from Barneston (Florence limestone) Limestone to Doyle (Towanda limestone) Shale was measured along west side of U.S. Highway 77 approximately 200 ft due east of GE-245 as follows: Oketo = 1.7 m (5.6 ft), Fort Riley = 9.9 m (35.2 ft), Holmesville = 4 m (12.4 ft), and Towanda = 1.8 m (6.0+ ft); six digital photos as follows: one of Oketo-Fort Riley contact, one of “rim rock”, one of top of Fort Riley, two of Holmesville, and one of upper Holmesville and Towanda. Griffin (1974) (measured section 2) measured and described 2.52 m (8.3 ft) of Oketo on east side of U.S. Highway 77 at this site.



GE-245 (cont.)



GE-246 = Barneston (Oketo shale and Fort Riley limestone) Limestone and lower Doyle Shale exposed in road cut on east side of U.S. Highway 77, with base of "rim rock" at 360 m (1181 ft); one digital photo; approximately 100 ft north of center of NW1/4, Sec. 22, T.11S., R.5E., Geary Co., Kansas. Griffin (1974) (measured section 1) measured and described 3.73 m (12.2 ft) of Oketo shale on the east side of U.S. Highway 77 but apparently located it incorrectly; the sequence is in the NW1/4, SE1/4, SE1/4 of Sec. 22.

GE-247 = Barneston (Oketo shale and Fort Riley limestone) Limestone and lower Doyle Shale exposed in road cut on west side of U.S. Highway 77, with base of Towanda limestone at 371 m (1217 ft); one digital photo; approximately 300 ft northwest of GE-246, near center of SE1/4, NW1/4, NW1/4, Sec. 22, T.11S., R.5E., Geary Co., Kansas. Section J-56, sequence from the upper Wymore shale to the Towanda limestone, is located in Sec. 22, T.11S., R.5E., Geary Co., Kansas.

GE-248 = Doyle (Towanda limestone) Shale well exposed in road cuts on both sides of U.S. Highway 77, with base of Towanda limestone at 370 m (1214 ft); one digital photo; approximately 200 ft north of center of S1/2, SW1/4, Sec. 15, T.11S., R.5E., Geary Co., Kansas. Measured section 110A of Mazzullo et al., 1997, is a composite based of road cut exposures from the NW1/4, Sec. 22 and the SW1/4, Sec. 15, T.11S., R.5E., Geary Co., Kansas.

GE-249 = Barneston (Fort Riley limestone) Limestone exposed in road cut on northwest side of old U.S. Highway 77, with base of "rim rock" at 355 m (1165 ft); one digital photo; approximately 200 ft east of the southwest corner of SW1/4, NW1/4, NE1/4, Sec. 15, T.11S., R.5E., Geary Co., Kansas.

GE-250 = Winfield (Stovall limestone) Limestone exposed in road ditch on east side of road, with base of Stovall limestone at 389 m (1276 ft); one digital photo; near center of west line of NW1/4, NW1/4, SW1/4, Sec. 2, T.11S., R.5E., Geary Co., Kansas. GE-250 is in an area of old quarries, probably in the Towanda limestone.

GE-251 = Winfield (Stovall limestone) Limestone exposed in road ditch on east side of Old Quarry Road, with base of Stovall limestone at 385 m (1263 ft); one digital photo.; near center of west line of SW1/4, SW1/4, SW1/4, Sec. 3, T.11S., R.5E., Geary Co., Kansas.

GE-272 = Wreford (Schroyer limestone) Limestone through part of the Matfield (Wymore shale, Kinney limestone, and lower beds of the Blue Springs shale) Shale exposed in hillside on north side of old U.S. Highway 40, now Golden Belt Blvd., at site of new construction, with top of Wreford (Schroyer limestone) Limestone at 338 m (1109 ft); two digital photos; just north of center of NE1/4, SE1/4, SW1/4, Sec. 14, T.12S., R.5E., Geary Co., Kansas.

NOTE: The following five sites (GE-309 through GE-312, and RL-1) are on the Fort Riley Military Reservation and are located east of Governor Harvey Canyon along Trooper Drive. The Public Land Survey System (PLSS) locations are only approximate as this system is not used on the Military Reservation and is not shown on the USGS quadrangles.

*GE-309 = Matfield (upper Wymore shale, Kinney limestone and Blue Springs shale) Shale exposed in road cut on west side Trooper Drive, with Kinney limestone at 345 m (1132 ft); lower (Florence limestone) Limestone exposed above at top of hill; two digital photos; near center of west line of NW1/4, SW1/4, SW1/4 Sec. 24, T.11S., R.5E., Geary County, Kansas.

*GE-310 = Barneston (Florence limestone, Oketo shale and Fort Riley limestone) Limestone, with “rim rock” and Oketo shale well exposed in a road cut on the east side of Trooper Drive; elevation near base of Florence limestone is 352 m (1155 ft); two digital photos (one near the base of the Florence limestone and one of the upper Florence limestone, Oketo shale, and Fort Riley limestone “rim rock”); approximately 200 ft east of center of north line of NW1/4, SW1/4, Sec. 24, T.11S., R.5E., Geary Co., Kansas.

*GE-311 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on east side of Trooper Drive just south of junction with Ernie Pyle Drive at 362 m (1188 ft); three digital photos: a general view of exposure, one of site where elevation was determined, and a close-up of in situ *Wilkingia*, *Reticulatia*, and an *Aviculopinna* oriented with long axis parallel to bedding in Oketo shale; near center of north line of SE1/4, SW1/4, NW1/4, Sec. 24, T.11S., R.5E., Geary Co., Kansas.

GE-311 (cont.)

*GE-312 = Barneston (Fort Riley limestone) Limestone and Doyle (Holmesville shale and Towanda limestone) Shale exposed in road cuts on both sides of Trooper Drive, with top of Fort Riley limestone at 370 m (1214 ft); 4 m (13 ft) of Holmesville shale (hand leveled), base of Towanda limestone at 374 m (1227 ft); continuation of sequence that actually begins at GE-309; two digital photos: one from east side and one, a more general view, from west side; approximately 150 ft west of center of NW1/4, Sec. 24, T.11S., R5E., Geary Co., Kansas.

*RL-1 = Winfield (Stovall limestone) Limestone, with fault, exposed on both sides of Trooper Drive at 395 m (1296 ft); displacement probable result of collapse with dissolution of evaporates in underlying units; continuation of sequence that actually begins at GE-309; six digital photos: the second and third are of a 3-dm-thick *Derbyia* shell bed (the top is 9 dm below base of Stovall limestone); approximately 200 ft southeast of center of NE1/4, SW1/4, Sec. 13, T.11S., R.5E., Riley Co., Kansas.






*GE-313 = Barneston (Fort Riley limestone “rim rock” and upper Oketo shale) Limestone exposed in a road and field east of the road, with the “rim rock” at 357 m (1171 ft); one digital photo looking east near base of “rim rock” with Oketo shale below; east of Breakneck Canyon, approximately 200 ft north and 100 ft east of center of west line NW1/4, NW1/4, SW1/4, Sec. 13, T.11S., R.5E., Geary Co., Kansas.

NOTE: Sites GE-314-318 are within the Fort Riley Military Reservation in Geary County, Kansas, and PLSS designations are not available. See Appendix A for GPS coordinates.

*GE-314 = Matfield (Wymore shale, Kinney limestone, Blue Springs shale) Shale and lower beds of Barneston (Florence limestone) Limestone exposed in road cut along east side of road on northeast side of Camp Moon Lake, with base of the Florence at 355 m (1165 ft); one digital photo.

*GE-315 = Barneston (Fort Riley limestone “rim rock) Limestone exposed in a Fort Riley limestone quarry along road near east end of Sherman Heights, with “rim rock” at 373 m (1224 ft); one digital photo.

*GE-316 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut in old quarry behind new school on west side of road, with “rim rock” at 379 m (1243 ft), near heliport between Machine Gun Ridge and Magazine Canyon; one digital photo.

*GE-317 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on east side of Caisson Road, with base of Florence limestone at 363 m (1191 ft); northwest of Camp Whiteside and northeast of Onemile Creek; one digital photo.

*GE-318 = Matfield (Kinney limestone) Shale exposed in old excavation east of Caisson Road, with Kinney limestone at 357 m (1171 ft); blocks of Kinney have been pushed on top of this single, in-place bed; northwest of Camp Whiteside and northeast of Onemile Creek; one digital photo.

OGDEN QUADRANGLE

Field work was conducted during January–March of 2005

G-3 = Sequence from Bader (Eiss limestone) Limestone to Barneston (Florence limestone) Limestone; near center of NE1/4, Sec.3, T.12S., R.7E., Geary Co., Kansas; date and author unknown.

G-4 = Sequence from Bader (Eiss limestone) Limestone to Wreford (Threemile limestone) Limestone with interval between covered; Sec. 18, T.12S., R.7E., Geary Co., Kansas; date and author unknown.

G-11 = Sequence from upper Speiser Shale to Matfield (lower Wymore shale) Shale in road cuts on U.S. Hwy 40 about 4 miles east of Junction City in NE1/4, NE1/4, Sec.34, T.11S., R.6E., Geary Co., Kansas; measured and described by D. E. Hattin as part of doctoral dissertation, undated.

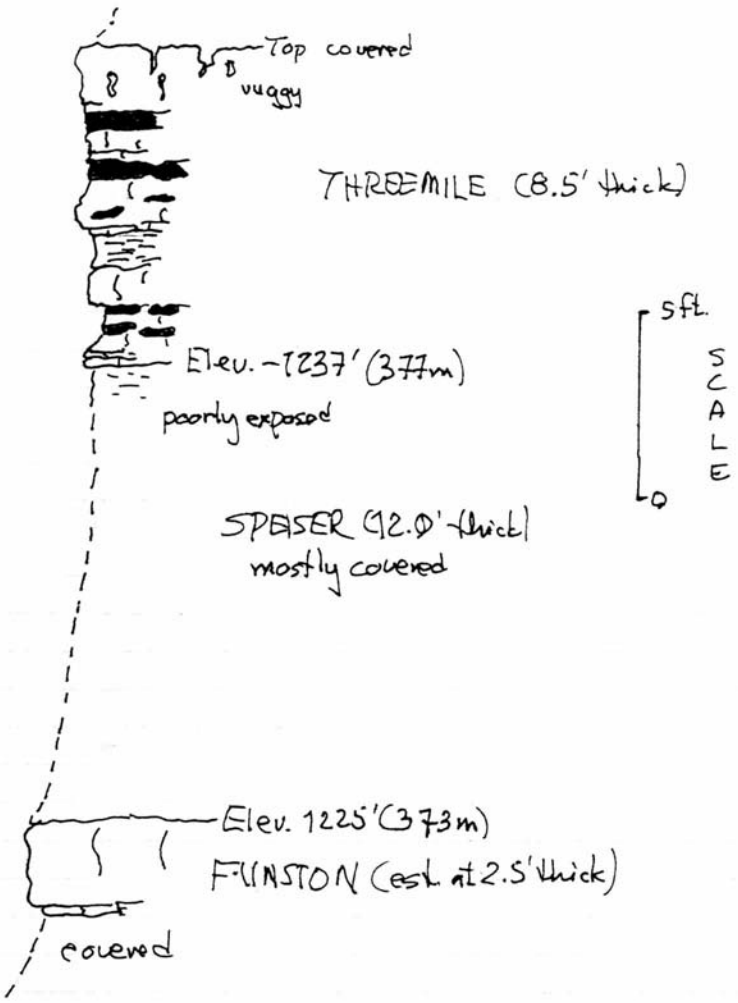
J-68 = Sequence from upper Stearns Shale to the lower Barneston (Florence limestone) Limestone; same geographic locality as G-3 above.

J-69 = Same as G-4 above.

GE-71 = Wreford (Threemile limestone) Limestone (good exposure of Threemile "rim rock") exposed in road cuts on both sides of Hannagan Road, with base of Threemile limestone at 375 m (1230 ft), one digital photo; just southwest of northeast corner Sec. 33, T.11S., R.7E., Geary Co., Kansas.

GE-72 = Wreford (Threemile limestone) Limestone exposed in road cut on south side of Tully Hill road, with base of Threemile limestone at 377 m (1237 ft); 2.6 m (8.5 ft) of Threemile limestone exposed above 4 m (12 ft) of Speiser Shale, with about 0.8 m (2.5 ft) of upper Funston Limestone at 373 m (1225 ft), see graphic section; three digital photos: one of Threemile and two of Funston; just north of center of NW1/4, NE1/4, Sec. 3, T.12S., R.7E., Geary Co., Kansas.

SITE - GE-72 - OGDEN QUAD.



GE-73 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale and Kinney limestone) Shale exposed in road cut on north side of Tully Hill Road, with base of Florence limestone at 403 m (1322 ft); top of Kinney limestone at 397 m (1303 ft); 6 m (19 ft) of Blue Springs shale and 1 m (3.4 ft) Kinney limestone; one digital photo; near center of NW1/4, NE1/4, NW1/4, Sec. 3, T.12S., R.7E., Geary Co., Kansas.

NOTE: GE-72 and GE-73 are similar to section 115 in Mazzullo et al. (1997) and also to exposures at G-3 and J-68.

GE-74 = Wreford (lower Threemile limestone) Limestone well exposed in road ditch on north side of Tully Hill Road, with estimated base of Threemile limestone at 374 m (1227 ft); one digital photo; northwest corner Sec. 3, T.12S., R.7E., Geary Co., Kansas.

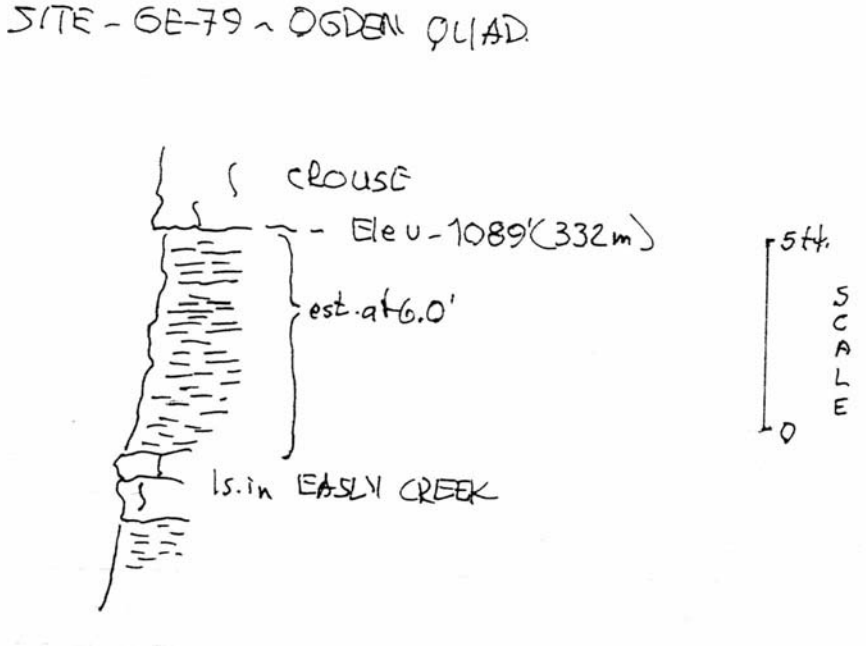
GE-75 = Barneston (Fort Riley limestone, “rim rock”) Limestone exposed in road cuts on both sides of Tully Hill Road, with “rim rock” at 413 m (1355 ft); one digital photo; northwest corner Sec. 4, T.12S., R.7E., Geary Co., Kansas.

GE-76 = Barneston (Fort Riley limestone, “rim rock”) Limestone exposed in road cut on north side of Tully Hill Road, with “rim rock” at 398 m (1306 ft); two digital photos: one of “rim rock” and one of burrow in limestone; just south of center of SW1/4, SW1/4, Sec. 31, T.11S., R.7E., Geary Co., Kansas.

GE-77 = Barneston (Florence limestone) Limestone exposed in road cut on north side of Tully Hill Road, with base of Florence limestone at 383 m (1256 ft), the “Cole Creek” limestone (lowermost Florence) as defined by Mazzullo et al. (1997) is well exposed here; one digital photo; just south of center of west line, SW1/4, SW1/4, Sec. 31, T.11S., R.7E., Geary Co., Kansas.

GE-78 = Wreford (Threemile limestone) Limestone and Speiser Shale exposed in road cut just northeast of junction of Tully Hill Road and Humboldt Creek Road, with base of Threemile limestone at 349 m (1145 ft); good contact; one digital photo; near center of N1/2, Sec. 1, T.12S., R6E., Geary Co., Kansas.

GE-79 = Crouse Limestone exposed in road cut just northeast of junction of Interstate Highway 70 and Humboldt Creek Road, with base of Crouse Limestone at 332 m (1089 ft); limestone in Easly Creek Shale exposed about 2 m (6.0 ft) below base of Crouse Limestone, see graphic section; Loc. E of Crouse study in GSA guidebook (West, 1972); two digital photos; just northwest of center of SW1/4, Sec. 25, T.11S., R.6E., Geary Co., Kansas.



GE-80 = Funston Limestone exposed in hillside on east side of Humboldt Creek Road, at 345 m (1132 ft); formation consists of two limestone beds (lower limestone is more prominent) with a spring at base; one digital photo; center, NW1/4, SW1/4, Sec. 36, T.11S., R.6E., Geary Co., Kansas.

GE-81 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on north side of Clarks Creek Road, with base of Florence limestone at 340 m (1115 ft); one digital photo; just northeast of center of west line, NW1/4, Sec. 35, T.11S., R.6E., Geary Co., Kansas.

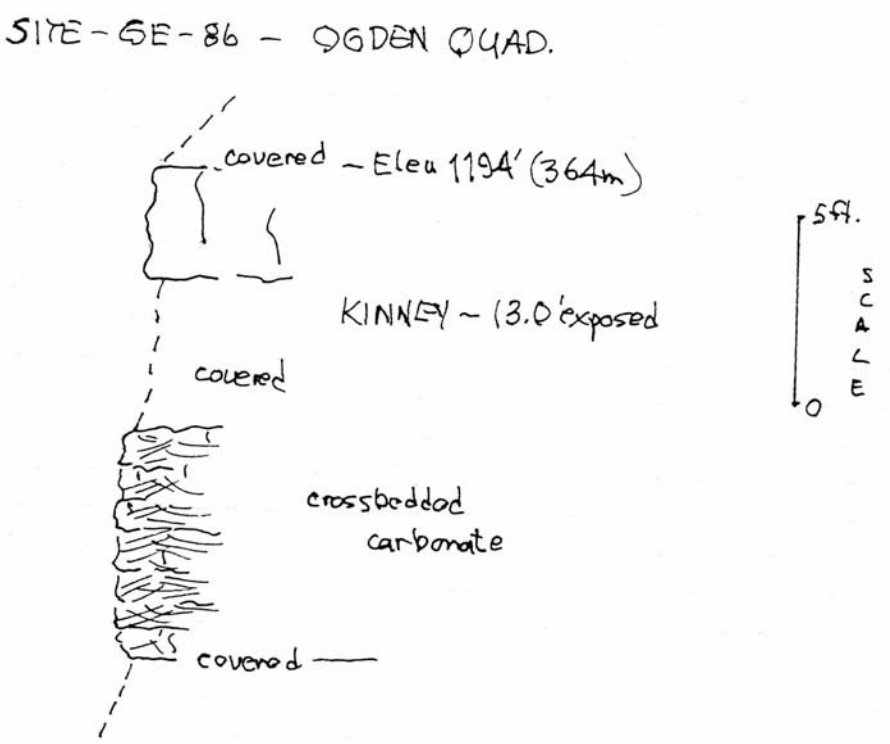
GE-83 = Wreford (Threemile limestone) Limestone exposed in road cuts on both sides of Kansas Highway 57, with base of Threemile limestone at 350 m (1148 ft); one digital photo; near center of south line, SE1/4, SE1/4, NE1/4, Sec. 15, T.12S., R.6E., Geary Co., Kansas.

GE-84 = Wreford (Threemile limestone) Limestone and Speiser Shale well exposed in stream bank north of Burley Hill Road, with base of Threemile limestone at 348 m (1142 ft); one digital photo; near center of E1/2, SE1/4, Sec. 11, T.12S., R.6E., Geary Co., Kansas.

GE-85 = Top of Wreford (Schroyer limestone) Limestone poorly exposed in road cut on south side of Burley Hill Road, with top of Schroyer limestone at 360 m (1181 ft); Matfield (Wymore shale) Shale appears thin at this site; one digital photo; near center of SW1/4, SW1/4, Sec. 12, T.12S., R.6E., Geary Co., Kansas.

GE-86 = Matfield (Kinney limestone) Shale equivalent (crossbedded in lower part) exposed in road cut on south side of Burley Hill Road at 364 m (1194 ft); see graphic section; five digital photos; approximately 200 ft east of GE-85 which is near center of SW1/4, SW1/4, Sec. 12, T.12S., R.6E., Geary Co., Kansas.

GE-86 (cont.)


SITE - GE - 86 - OGDEN QUAD.
covered - Elev 1194' (364m)
KINNEY - 13.0' exposed
covered
crossbedded carbonate
covered
5ft.
SCALE
0

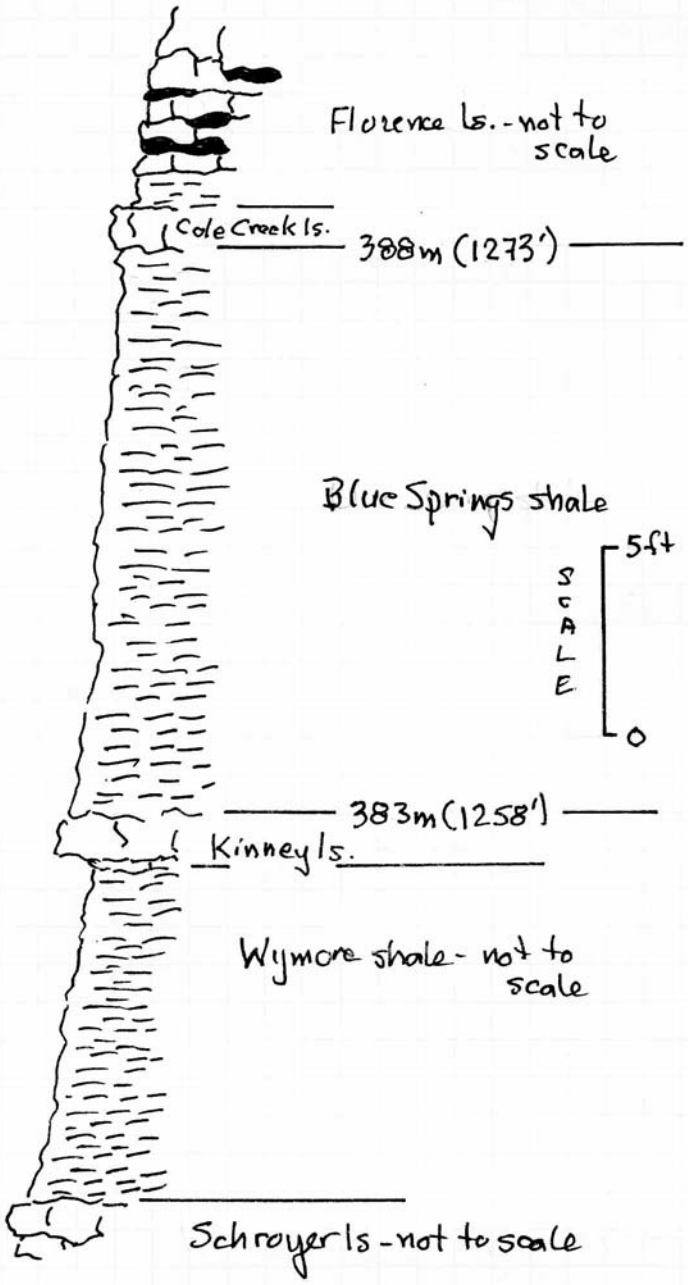
GE-87 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on south side of Burley Hill Road, with base of Florence limestone at 378 m (1240 ft); one digital photo; approximately 500 ft east of GE-85; near center of SW1/4, SW1/4, Sec. 12, T.12S., R.6E., Geary Co., Kansas.

GE-88 = Barneston (Fort Riley limestone "rim rock") Limestone exposed along south side of Burley Hill Road, with "rim rock" at 395 m (1296 ft); one digital photo; near center of SW1/4, SE1/4, SW1/4, Sec. 12, T.12S., R.6E., Geary Co., Kansas.

GE-89 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed along south side of Burley Hill Road, with “rim rock” at 399 m (1309 ft); one digital photo; near center of NW1/4, NW1/4, SW1/4, Sec. 18, T.12S., R.7E., Geary Co., Kansas.

GE-90 = Barneston (Florence limestone) Limestone, Matfield Shale, and upper Wreford (Schroyer limestone) Limestone well exposed in road cut on north side of Burley Hill Road, with base of Florence limestone at 388 m (1273’ ft); 5 m (15 ft) of Blue Springs shale exposed below Florence limestone, followed by 0.5 m (1.5 ft) of Kinney limestone [top of Kinney at 383 m (1258 ft)], and Wymore shale down to the top of Wreford (Schroyer limestone) Limestone; “Cole Creek” limestone (lowermost Florence limestone) as defined by Mazzullo et al. (1997) is well developed, see graphic section; two digital photos: one of Florence and one of Kinney; just south of center of N1/2, Sec. 18, T.12S., R.7E., Geary Co., Kansas.

SITE ~ GE-90 - OGDEN QUAD.



GE-91 = Wreford (Schroyer limestone) Limestone exposed in road and road ditch on south side of Burley Hill Road, with top of Schroyer limestone at 370 m (1214 ft); one digital photo; approximately 400 ft northeast of GE-90; just south of center of N1/2, Sec. 18, T.12S., R.7E., Geary Co., Kansas.

GE-92 = Wreford (Threemile limestone) Limestone exposed in road ditch on south side of Simpson Ranch Road, with base of Threemile limestone at 364 m (1194 ft); one digital photo; just west of center of NW1/4, NE1/4, NW1/4, Sec. 17, T.12S., R.7E., Geary Co., Kansas.

GE-93 = Wreford (Schroyer limestone) Limestone exposed in road ditch on south side of Simpson Ranch Road, with top of Schroyer limestone at 374 m (1227 ft), approximately 0.3 m (1 ft) of coated grainstone (ostracodes and snails) overlain by about 0.15 m (0.5 ft) of light-gray carbonate mudstone with greenish-gray clay splotches, fenestra, and vertical fractures (a high intertidal to low supratidal carbonate); two digital photos; near center of north line, Sec. 17, T.12S., R.7E., Geary Co., Kansas.

GE-94 = Matfield (Kinney limestone) Shale exposed in hillside on north side of Simpson Ranch Road at 398 m (1306 ft); one digital photo; just southeast of center of W1/2, NW1/4, Sec. 15, T.12S., R.7E., Geary Co., Kansas.

GE-95 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road and on south side of Simpson Ranch Road, with “rim rock” at 421 m (1381 ft); one digital photo; approximately 400 ft northeast of center of Sec. 15, T.12S., R.7E., Geary Co., Kansas.

GE-96 = Barneston (Florence limestone) Limestone poorly exposed on south side of Simpson Ranch Road, with base of Florence at 409 m (1342 ft); one digital photo; near center of south line, SW1/4, SE1/4, NE1/4, Sec. 15, T.12S., R.7E., Geary Co., KS.

GE-97 = Wreford (Threemile limestone) Limestone exposed along road cut on northeast side of Humboldt Creek Road, with base of Threemile limestone at 368 m (1207 ft); one digital photo; near center of east line, SE1/4, SE1/4. SE1/4, Sec. 17, T.12S., R.7E., Geary Co., Kansas.

GE-98 = Wreford (Threemile limestone) Limestone and Speiser Shale exposed in road cut on east side of Humboldt Creek Road, with base of Threemile limestone at 356 m (1168 ft); one digital photo; approximately 400 ft northwest of center of E1/2, SE1/4, Sec. 7, T.12S., R.7E., Geary Co., Kansas.

GE-99 = Funston Limestone exposed in road cut on east side of Humboldt Creek Road at 354 m (1161 ft); one digital photo; just southeast of northwest corner SW1/4, SW1/4, NE1/4, Sec. 7, T.12S., R.7E., Geary Co., Kansas.

GE-100 = Wreford (Threemile limestone) Limestone and Speiser Shale exposed in road cut along access road northeast of junction of Interstate Highway 70 and Kansas Highway 18, with base of Threemile limestone at 347 m (1388 ft); one digital photo; approx. 300 ft east of center of SW1/4, SW1/4, Sec. 26, T.11S., R.6E., Geary Co., Kansas. Data point G-11 and locality 115 of Mazzullo et al. (1997) are just southwest of this site and section S of Voran (1977) is northwest.

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GE-101 = Barneston (Florence limestone through upper beds of Fort Riley limestone) Limestone with the upper Matfield (Blue Springs shale) Shale exposed in road cut on north side of Interstate Highway 70, with base of Florence limestone at 384 m (1260 ft) based on a KDOT profile; section 4 of Griffin (1974) is just east of this site; one digital photo; approximately 200 ft east of center of west line, NW1/4, SW1/4, Sec. 30, T.11S., R.7E., Geary Co., Kansas.

GE-102 = Crouse Limestone exposed in road cut on north side of Interstate Highway 70 along northwest access road at junction with McDowell Creek Road, with top of Crouse Limestone at 357 m (1171 ft) based on a KDOT profile; area of section D of Crouse Limestone study in GSA guidebook (West, 1972); one digital photo; approximately 400 ft north of center of Sec, 28, T.11S., R.7E., Geary Co., Kansas.

GE-105 = Crouse Limestone exposed in road cut on north side of Whiskey Lake Road, with base of Crouse Limestone at 329 m (1079 ft); section Q of Voran (1977); one digital photo; approximately 200 ft west of center of south line SW1/4, Sec. 23, T.11S., R.6E., Geary Co., Kansas.

GE-106 = Funston Limestone exposed in creek bed on both sides of bridge over Humboldt Creek Road just south of Humboldt Creek Cemetery on west side of road at 360 m (1181 ft); northeast corner Sec. 17, T.12S., R.7E., Geary Co., Kansas.

SWEDE CREEK QUADRANGLE

Field work was conducted during January–March of 2005

G-10 = Matfield (upper Blue Springs shale) Shale and Barneston (lower Florence limestone) Limestone exposed in road cut along U.S. Highway 40 at Manhattan sign 0.1 mile east of intersection with Kansas Highway 18; SW1/4, Sec. 28, T.11S., R.8E., Geary Co., Kansas; measured and described by S. M. and M. M. Ball in April, 1959.

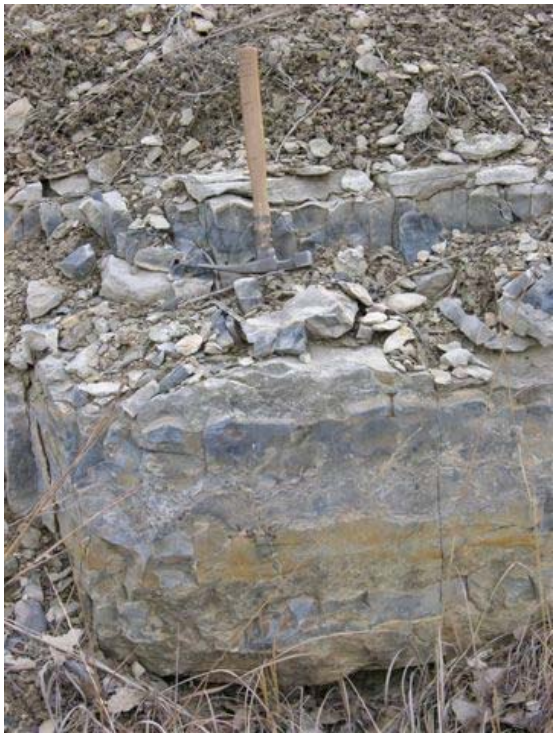
G-15 = Wreford (Threemile limestone) Limestone; Sec. 31, T.11S., R.8E., Geary Co., Kansas; measured and described by Jewett (no date).

J-59 = G-15.

GE-1 = Barneston (Florence limestone) Limestone exposed in road cut on east side of Kansas Highway 177, with base of Florence limestone at 438 m (1437 ft) from KDOT profile; one digital photo; near center of west line Sec. 28, T.11S., R.8E., Geary Co., Kansas.

GE-2 = Barneston (Florence limestone) Limestone exposed in road cut on north side of Interstate Highway 70 just west of Moritz Road interchange, with base of Florence limestone at 423 m (1388 ft) from KDOT profile; two digital photos; near center Sec. 30, T.11S., R. 8E., Geary Co., Kansas.

GE-3 = Wreford (Schroyer limestone) Limestone exposed in road cut on east side of Moritz Road, with top of Schroyer limestone at 403 m (1322 ft); three digital photos; near center Sec. 30, T.11S., R.8E.; approximately 0.2 mile southeast of GE-2; Geary Co., Kansas.



GE-8 = Matfield (Kinney limestone) Shale exposed on hillside on east side of Kansas Highway 177 at approximately 420 m (1378 ft); one digital photo; approximately 0.15 mile west of southwest corner Sec. 16, T.12S., R.8E., Geary Co., Kansas.

GE-9 = Wreford (Schroyer limestone) Limestone exposed in road cut on east side of Kansas Highway 177, with top of Schroyer limestone at approximately 405 m (1329 ft); one digital photo; near center of N1/2, NW1/4, Sec. 16, T.12S., R.8E., Geary Co., Kansas.

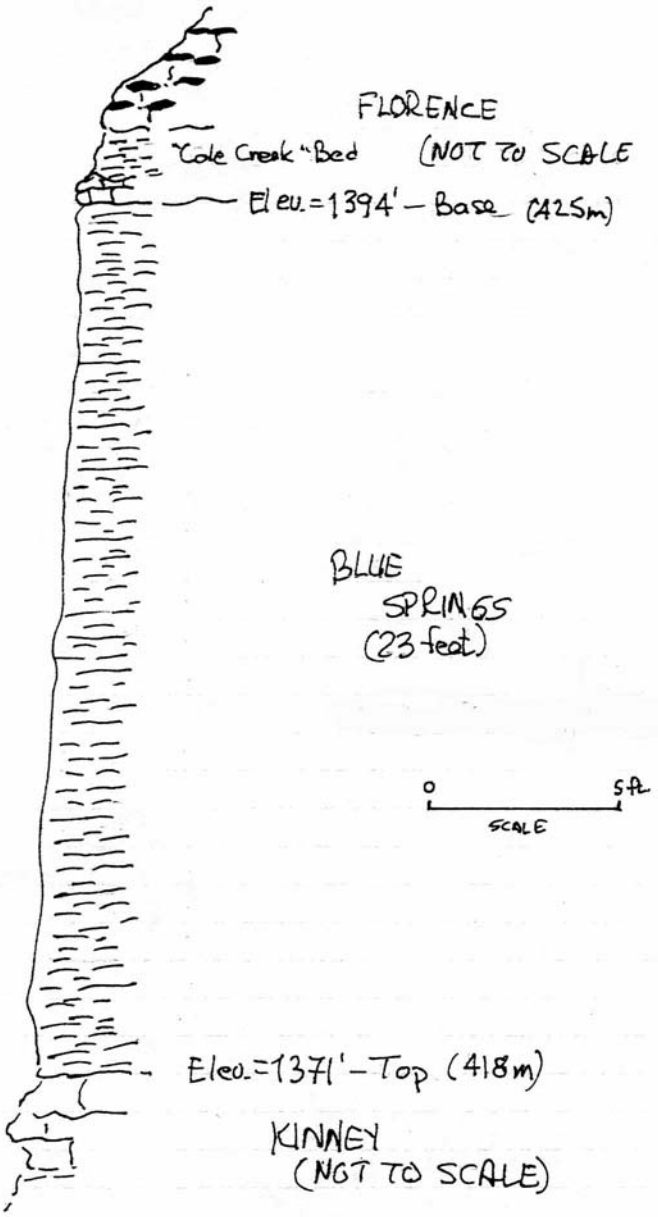
GE-10 = Wreford (Schroyer limestone) Limestone and lower Matfield (Wymore shale) Shale exposed in road cuts on both sides of Kansas Highway 177 at junction with Old Kansas Highway 18; top of Schroyer limestone at 405 m (1329 ft); no photo; near center SW1/4, SW1/4, Sec. 9, T.12S., R.8E., Geary Co., Kansas.

GE-11 = Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale) Shale exposed in road cut on west side of Kansas Highway 177 just south of Riley/Geary county line; base of Florence limestone at 440 m (1444 ft); one digital photo; near northeast corner Sec. 29, T.11S., R.8E., Geary Co., Kansas.

GE-12 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on west side of Kansas Highway 177, with base of Florence limestone at 435 m (1427 ft); one digital photo; near northwest corner Sec. 33, T.11S., R.8E., Geary Co., Kansas.

GE-13 = Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale and Kinney limestone) Shale exposed in road cut on west side of Kansas Highway 177, with base of Florence limestone at 425 m (1394 ft) and Kinney limestone at 418 m (1371 ft); Blue Springs is 7 m (23 ft) (hand leveled) thick; see graphic section; two digital photos; south of center of west line, Sec. 5, T. 12S., R.8E., Geary Co., Kansas.

SITE – GE-13 – SWEDE CREEK QUAD.



GE-14 = Top of Wreford (Schroyer limestone) Limestone exposed in road cuts on both sides of Kansas Highway 177, with top of Schroyer limestone at approximately 405 m (1329 ft); one digital photo; north of center of west line, Sec. 9, T.12S., R.8E., Geary Co., Kansas.

GE-15 = Matfield (Kinney Limestone) Shale exposed in road cuts on both sides of Kansas Highway 177, with top of Kinney limestone at 410 m (1345 ft); one digital photo; approximately 0.1 mile south of GE-14 along west line, Sec. 9, T.12S., R.8E., Geary Co., Kansas.

GE-16 = Matfield (Wymore shale, Kinney limestone, and Blue Springs shale) Shale and lower Barneston (Florence limestone) Limestone exposed in road cuts along both sides of Kansas Highway 177, with base of Florence limestone at 420 m (1378 ft) and top of Kinney limestone at 414 m (1358 ft); one digital photo; near center of east line, NW1/4, Sec. 9, T.12S., R.8E., Geary Co., Kansas.

GE-17 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in bank of farm pond west of Kansas Highway 177, with base of Threemile limestone near 390 m (1280 ft); one digital photo; approximately 0.2 mile west of center of east line, Sec. 8, T.12S., R.8E., Geary Co., Kansas.

GE-18 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road ditch on west side of Kansas Highway 177, with base of Threemile limestone near 390 m (1280 ft); one digital photo; approximately 0.1 mile north of GE-14 along west line, Sec. 9, T.12S., R.8E., Geary Co., Kansas.

NOTE: Sites GE-13 through GE-18 are locality 114 of Mazzullo et al. (1997).

GE-19 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in pond bank in pasture north of Old Kansas Highway 18, with base of Florence limestone at approximately 430 m (1411 ft); one digital photo; near southeast corner Sec. 9, T.12S., R.8E., Geary Co., Kansas.

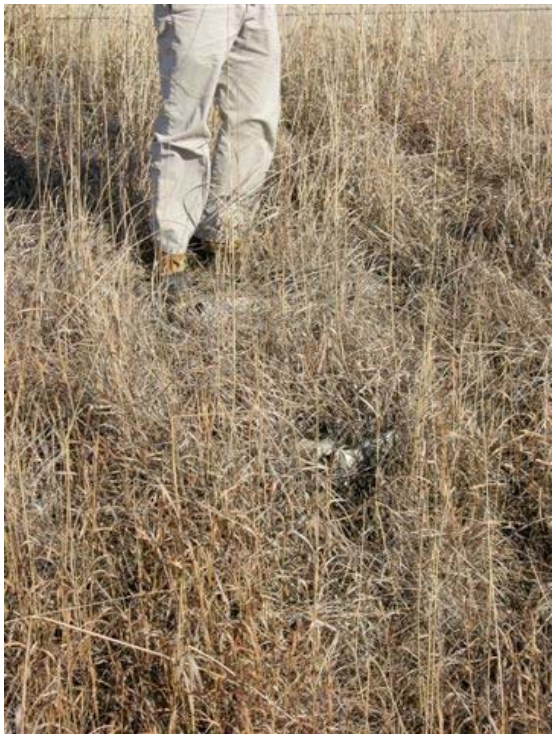
GE-20 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed along south side of Old Kansas Highway 18, with base of Threemile limestone at 390 m (1280 ft); one digital photo; near southwest corner Sec. 9, T.12S., R.8E., Geary Co., Kansas.

GE-21 = Wreford (Schroyer limestone) Limestone exposed along Old Kansas Highway 18, with top of Schroyer limestone at 407 m (1335 ft); one digital photo; SW1/4, SW1/4, SE1/4, Sec. 17, T.12S, R.8E., Geary Co., Kansas.

GE-22 = Wreford (Schroyer limestone) Limestone exposed along Old Kansas Highway 18, with top of Schroyer limestone at 403 m (1322 ft); one photo; approximately 0.15 mile south of center of north line, Sec. 17, T.12S., R.8E., Geary Co., Kansas.

GE-23 = Wreford (Schroyer limestone) Limestone exposed in road and road ditch on east side of Rooks Ranch Road, with top of Schroyer limestone at 405 m (1329 ft); one digital photo; SE1/4, Sec. 6, T.12S., R.8E., Geary Co., Kansas.

GE-24 = Wreford (Schroyer limestone) Limestone exposed in road ditch on east side of Rooks Ranch Road, with top of Schroyer limestone at 405 m (1329 ft); one digital photo; NE1/4, Sec. 6, T.12S., R.8E., Geary Co., Kansas.



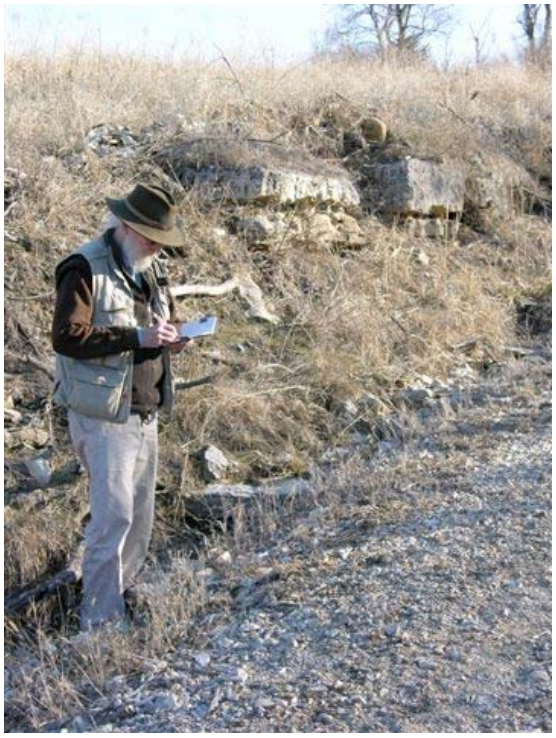
GE-25 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed along south-facing bank of stream cut behind storage building along Rooks Ranch Road, with base of Threemile limestone at 390 m (1280 ft); one digital photo; approximately 0.15 mile north of GE-24; NE1/4, Sec. 6, T.12S., R.8E., Geary Co., Kansas.

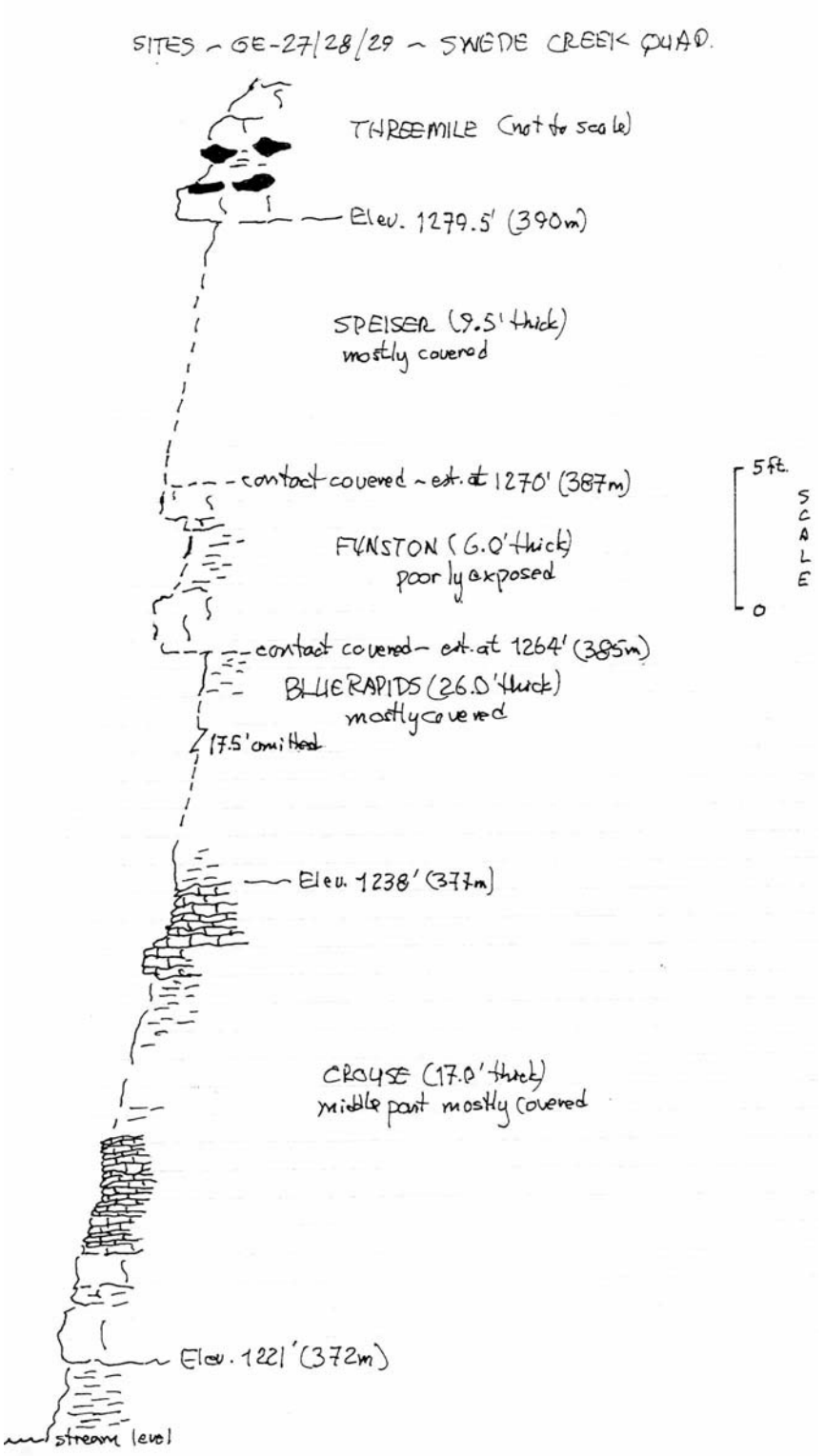
GE-26 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road ditch on east side of Rooks Ranch Road, with base of Threemile limestone at 395 m (1296 ft); one digital photo; near northeast corner Sec. 31, T.11S., R.8E., Geary Co., Kansas.

GE-27 = Crouse Limestone exposed in road cut on west side of Moritz Road, with top of Crouse Limestone at 377 m (1238 ft) and base exposed in north-facing stream bank at 372 m (1221 ft); Crouse Limestone is 5 m (17 ft thick) (hand leveled) with the Easly Creek Shale exposed below in the stream bank, see graphic section below GE-28; two digital photos; NE1/4, NW1/4, Sec. 6, T.12S., R.8E., Geary Co., Kansas. See Measured Section (composite GE-27, GE-28, and GE-29) below.

GE-28 = Funston Limestone; 2 m (6 ft) exposed in road cut of east side of Moritz Road, contacts covered; top of Funston Limestone estimated at 385 m (1263 ft), see graphic section below; one digital photo; approximately 0.05 mile south of GE-27; NE1/4, NW1/4, Sec. 6, T.12S., R.8E., Geary Co., Kansas. See Measured Section (composite GE-27, GE-28, and GE-29) below.

GE-29 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road ditch on east side of Moritz Road, with base of Threemile limestone at 390 m (1279 ft); see graphic section; one digital photo; approximately 0.1 mile south of GE-27 in NE1/4, NW1/4, Sec. 6, T.12S., R.8E., Geary Co., Kansas. See Measured Section (composite GE-27, GE-28, and GE-29) below.





Hand leveled sequence from base of Crouse Limestone to base of Wreford (Threemile limestone) Limestone.

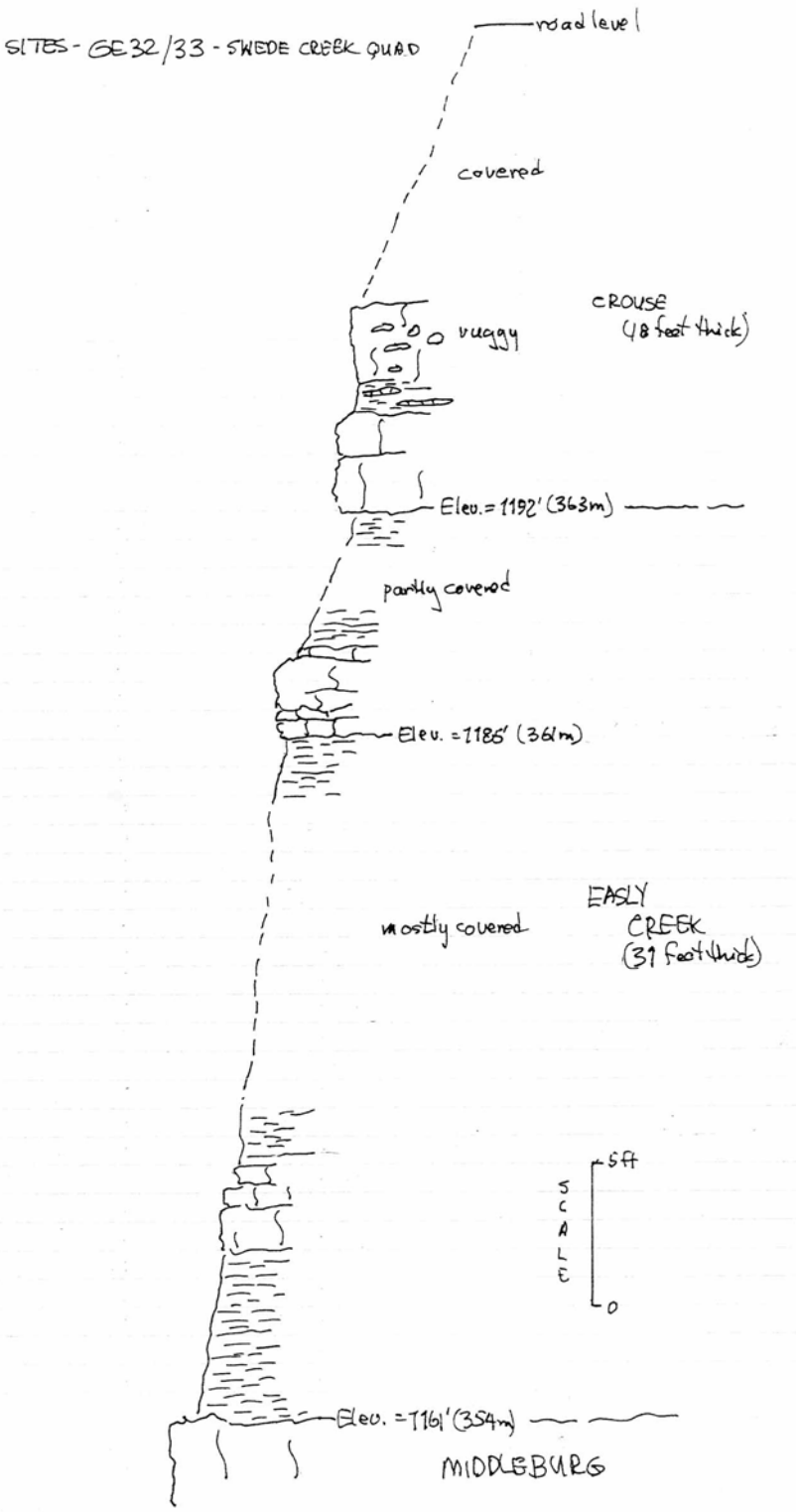
GE-30 = Funston Limestone [2+ m (6+ ft)] exposed in pasture on west side of Moritz Road, spring near base, contacts covered, top of Funston Limestone estimated at 385 m (1263 ft); one digital photo; approximately 0.3 mile southwest of center of Sec. 31, T.11S., R.8E., Geary Co., Kansas.

GE-31 = Easly Creek Shale and Crouse Limestone exposed in road cut on north side of Old Kansas Highway 18; near section R of Voran (1977), with base of Crouse Limestone at approximately 364 m (1194 ft); four digital photos: two of Crouse Limestone (one of upper part, one of lower part), and two of limestone in Easly Creek Shale (one is exposure on east side of road north to GE-34); near center of south line, SW1/4, NE1/4, Sec. 1, T.12S., R.7E., Geary Co., Kansas.

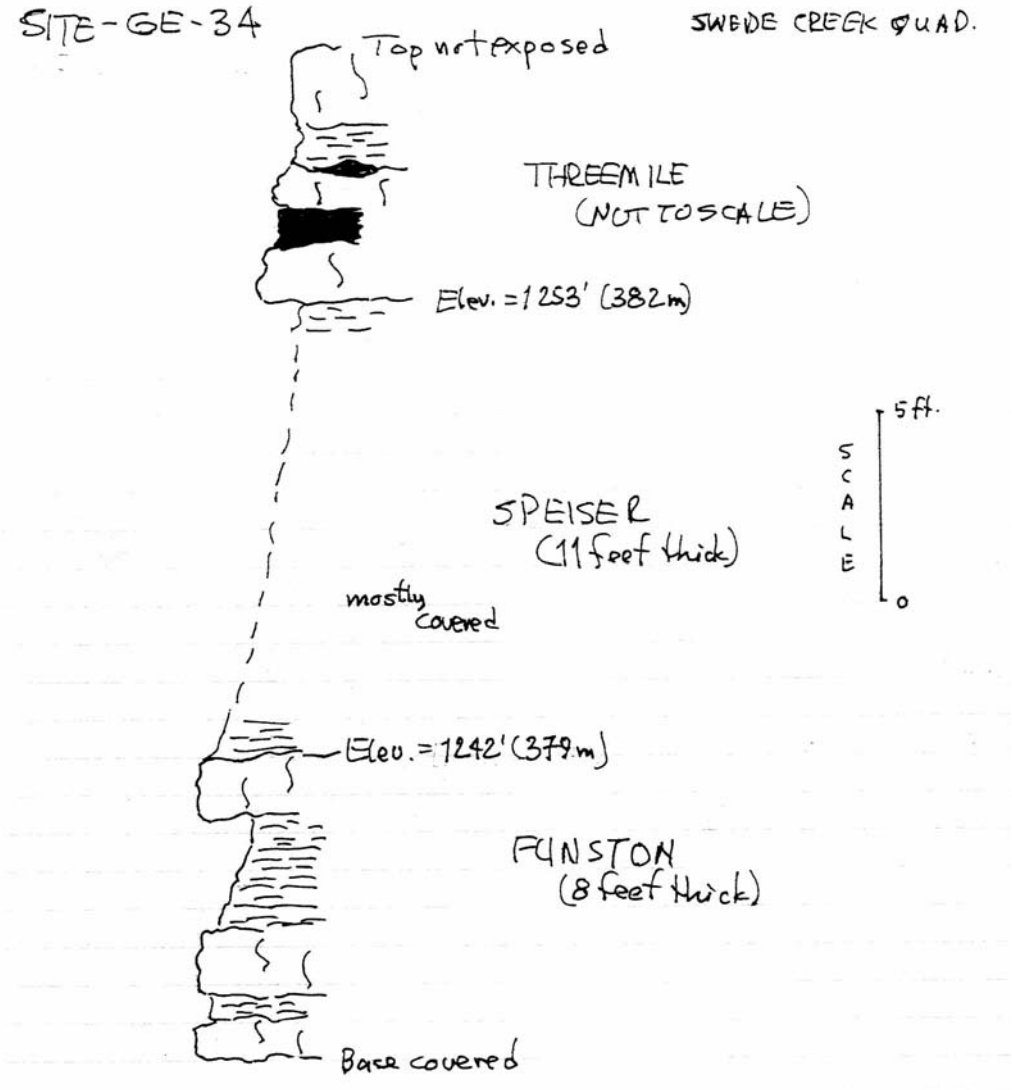
GE-31 (cont.)

GE-32 = Bader (Middleburg limestone) Limestone exposed in east bank of a northwest-southeast-flowing stream, with top of Middleburg limestone at approximately 354 m (1161 ft); one digital photo; approximately 400 ft south of center of east line, Sec. 1, T.12S., R.7E., Geary Co., Kansas. See measured section below.

GE-33 = Easly Creek Shale and Crouse Limestone exposed in road ditch on north side of Old Kansas Highway 18, with base of limestone in upper part of Easly Creek Shale at 360 m (1181 ft) and base of Crouse Limestone 2 to 2.5 m (7 to 8 ft) above (vertical distance hand-leveled); thickness from top of Bader Limestone at GE-32 to base of limestone in upper Easly Creek Shale is 7 m (24 ft) (vertical distance hand-leveled) and from this point to upper Crouse Limestone (high point in road) is 8 m (25 ft); see graphic section below; one digital photo; approximately 200 ft east of center of west line, Sec. 6, T.12S., R.8E., Geary Co., Kansas.


SITES - GE32/33 - SWEDE CREEK QUAD
road level
covered
vuggy
CROUSE
(48 feet thick)
Elev. = 1192' (363m)
partly covered
Elev. = 1185' (361m)
mostly covered
EASLY
CREEK
(37 feet thick)
SCALE
5ft
0
Elev. = 1161' (354m)
MIDDLEBURG

GE-34 = Wreford (Threemile limestone) Limestone, Speiser Shale (mostly covered) and Funston Limestone (slightly south of this site) exposed in road cut on west side of road, with base of Threemile limestone at approximately 382 m (1253 ft); two digital photos; near center, SE1/4, SW1/4. SW1/4, Sec. 36, T.11S., R.7E., Geary Co., Kansas.

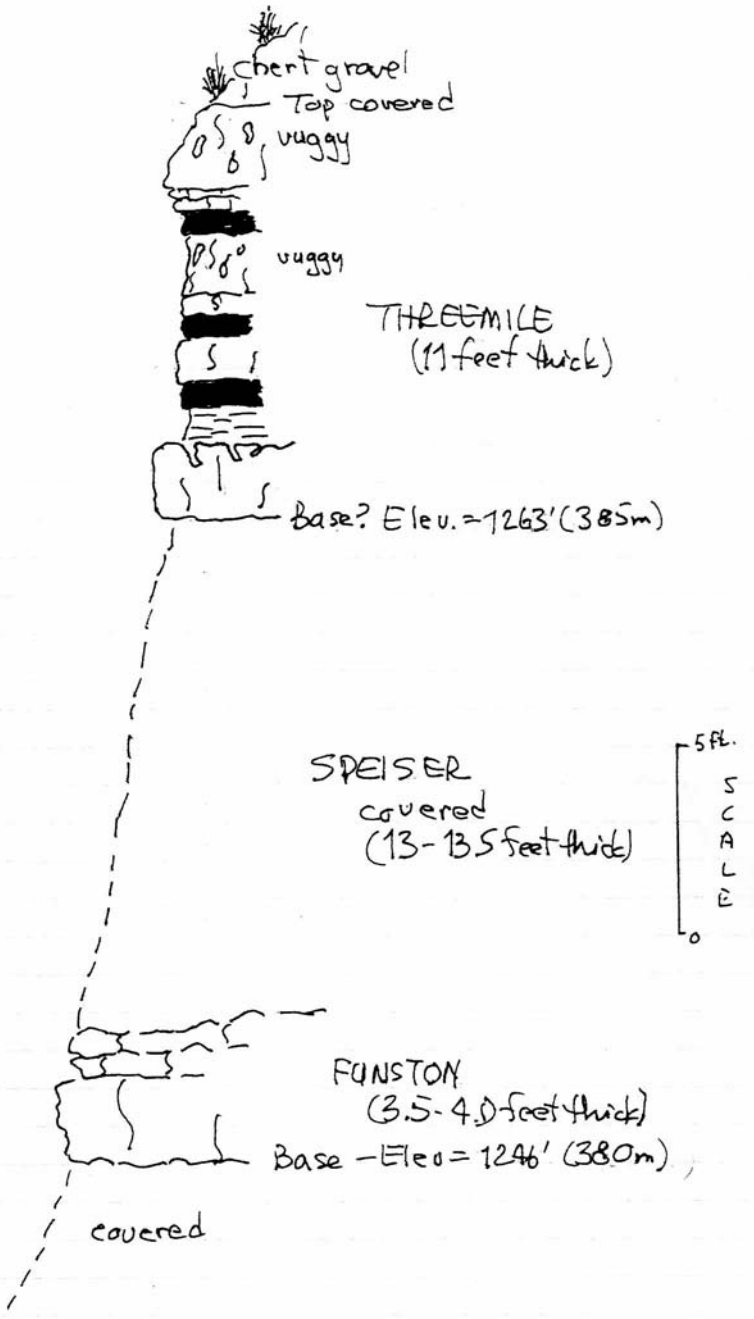


GE-35 = Bader (Middleburg limestone) Limestone exposed in creek bank on west side of Lower McDowell Road, with top of Middleburg limestone at approximately 355 m (1165 ft); one digital photo; near center NW1/4, NW1/4, NW1/4, Sec. 12, T.12S., R.7E., Geary Co., Kansas.

GE-36 = Crouse Limestone poorly exposed in road cut on west side of Lower McDowell Road, with base of Crouse Limestone at approximately 360 m (1181 ft); one digital photo; near southwest corner Sec. 1, T.12S., R.7E., Geary Co., Kansas.

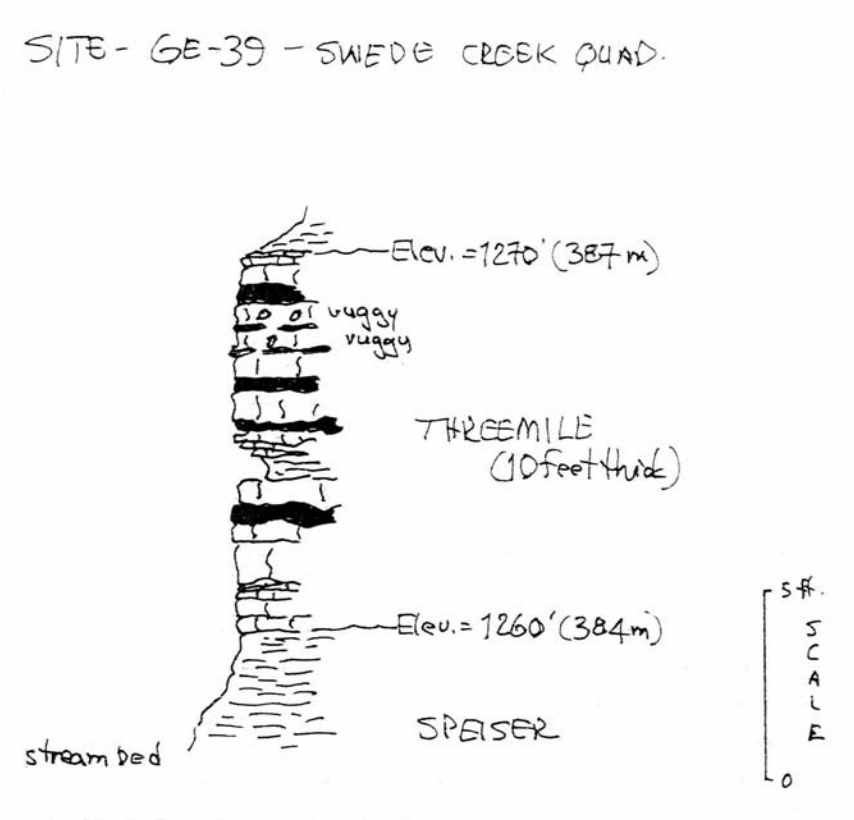
GE-37 = Wreford (Threemile limestone) Limestone, Speiser Shale (covered), and Funston Limestone exposed in road cut on north side of Simpson Ranch Road, with base of Threemile limestone at approximately 385 m (1263 ft) and base of Funston Limestone [5 m (17 ft) (hand- leveled)] below at 380 m (1246 ft); see graphic section; two digital photos: one of base of Threemile limestone, one of base of Funston Limestone; near center NW1/4, NW1/4, SE1/4, Sec. 13, T.12S., R.7E., Geary Co., Kansas.

SITE - GE-37 SWEDE CREEK QUAD.



GE-38 = Wreford (Schroyer limestone) Limestone exposed in Simpson Ranch Road, with top of Schroyer limestone at approximately 396 m (1299 ft); one digital photo; just south of center NE1/4, NE1/4, SW1/4, Sec. 13, T.12S., R.7E., Geary Co., Kansas.

GE-39 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cut on north side of Simpson Ranch Road, with base of Threemile limestone at approximately 384 m (1260 ft); see graphic section; one digital photo; near center of west line, NW1/4, SW1/4, Sec. 13, T.12S., R.7E., Geary Co., Kansas.



GE-40 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on south side of Simpson Ranch Road, with base of Florence limestone at approximately 410 m (1345 ft); one digital photo; near center of south line, NE1/4, NW1/4, SW1/4, Sec. 14, T.12S., R.7E., Geary Co., Kansas.

GE-41 = Wreford (Schroyer limestone) Limestone exposed in road cut on north side of Simpson Ranch Road at approximately 389 m (1276 ft); one digital photo; just south of center of NW1/4, SE1/4, Sec. 14, T.12S., R.7E., Geary Co., Kansas.

GE-55 = Crouse Limestone exposed in steam bed east of Lower McDowell Road, with top of Crouse Limestone at 372 m (1220 ft); one digital photo; near center S1/2, SE1/4, Sec. 13, T.12S., R.7E., Geary Co., Kansas.

GE-103 = Wreford Limestone and Speiser Shale exposed on south side of Interstate Highway 70, with base of Threemile limestone at 389 m (1276 ft) based on a KDOT profile, near section J of West (1972); one digital photo; near center W1/2, Sec. 25, T.11S., R.7E., Geary Co., Kansas.

GE-104 = Sequence from Beattie (Cottonwood limestone) Limestone to Wreford (Threemile limestone) Limestone exposed at Interstate Highway 70 and Deep Creek Road interchange, with top of Bader (Middleburg limestone) Limestone at 385 m (1263 ft); near section K of West (1972); four digital photos: one of Bader Limestone, one from Middleburg limestone to Crouse Limestone, and two from Crouse Limestone to Threemile limestone; near center of south line, SE1/4, SE1/4, NE1/4, Sec. 27, T.11S., R.8E., Geary Co., Kansas.

KANSAS FALLS QUADRANGLE

Field work was conducted during January–March of 2007.

GE-183 = Doyle (Holmesville shale) and upper Barneston (Fort Riley limestone) Limestone exposed in Zimmerman Road, with top of Fort Riley limestone at 381 m (1251 ft); one digital photo; approximately 200 ft south of center S1/2, Sec. 21, T.13S., R.5E., Geary Co., Kansas.

GE-184 = Doyle (Towanda limestone) Shale exposed in Zimmerman Road, with base of Towanda limestone at 385 m (1262 ft); one digital photo; approximately 100 ft south of center S1/2, Sec. 21, T.13S., R.5E., Geary Co., Kansas.

GE-185 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in Zimmerman Road and in fields on both sides of road, with “rim rock” at 367 m (1201 ft); one digital photo; approximately 250 ft south of center of north line, Sec. 21, T.13S., R.5E., Geary Co., Kansas.

GE-192 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed along west side of Beck Road, with base of “rim rock” at 366 m (1200 ft); one digital photo; approximately 250 ft south of center of N1/2, Sec. 4, T.13S., R.5E., Geary Co., Kansas.

GE-193 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed along road cut east side of Beck Road, with base of “rim rock” at 361 m (1185 ft); one digital photo; approximately 150 ft east and 30 ft north of center of south line, Sec. 33, T.12S., R.5E., Geary Co., Kansas.

GE-194 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut along southeast side of junction of Beck Road and River Road, with base of Florence limestone at 352 m (1154 ft); one digital photo; approximately 300 ft east of center of S1/2, Sec. 33, T.12S., R.5E., Geary Co., Kansas.

GE-197 = Doyle (Towanda limestone) Shale exposed in road cut on east side of Beck Road, with base covered but estimated at 379 m (1245 ft); one digital photo; approximately 350 ft south of center, Sec. 4, T.13S., R.5E., Geary Co., Kansas.

GE-198 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Schuler Road, with a good base of Towanda limestone at 372 m (1222 ft); one digital photo; center of west line, Sec. 7, T.13S. R.5E., Geary Co., Kansas.

GE-199 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Latzke Road, with base of Towanda limestone at 369 m (1211 ft); one digital photo; near center of south line of N1/2, SW1/4, Sec. 18, T.13S., R.5E., Geary Co., Kansas.

GE-200 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in road cut on south side of Latzke Road and in drainage on north side of road, with base of "rim rock" at 357 m (1170 ft); one digital photo; approximately 800 ft west of center of east line, Sec. 18, T.13S., R.5E., Geary Co., Kansas.

GE-201 = Barneston (Fort Riley limestone "rim rock") Limestone poorly exposed in North Latzke Road, with base of "rim rock" at 361 m (1184 ft), could be "second" bench in Fort Riley limestone; one digital photo; approximately 550 ft north of center of south line, Sec. 8, T.13S., R.5E., Geary Co., Kansas.

GE-202 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed along ridge on east side of Lyons Creek Road, with base of “rim rock” at 358 m (1175 ft); two digital photos; center of south line, NE1/4, NW1/4, Sec. 20, T.13S., R.5E., Geary Co., Kansas.

GE-203 = Doyle (Towanda limestone) Shale poorly exposed in road ditch on west side of Schuler Road, with base of Towanda limestone at 365 m (1198 ft); one digital photo; approximately 175 ft north of center of west line, Sec. 19, T.13S., R.5E., Geary Co., KS.

GE-204 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in field on south side of Kickapoo School Road, with base of “rim rock” at 364 m (1195 ft); one digital photo; approximately 600 ft south of center of north line, Sec. 29, T.13S., R.5E., Geary Co., Kansas.

GE-205 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone well exposed in pasture on both sides of road along the Geary-Dickinson county line, with base of “rim rock” at 358 m (1174 ft); one digital photo; approximately 350 ft south of center of west line, Sec. 36, T.13S., R.4E., Dickinson Co., Kansas, and approximately 350 ft south of center of east line, Sec. 31, T.13S., R.5E., Geary Co., Kansas.

GE-206 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on north side of Lyons Creek Road, with base of Florence limestone at 349 m (1145 ft); one digital photo; center S1/2, NE1/4, Sec. 31, T.13S., R.5E., Geary Co., Kansas.

GE-207 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone well exposed in road cut on north side of Kansas Highway 157, with base of “rim rock” at 366 m (1200 ft); one digital photo; near center of south line SE1/4, SW1/4, Sec.29, T.13S., R.5E., Geary Co., Kansas.

GE-208 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Kansas Highway 157, with base of Towanda limestone at 384 m (1260 ft); one digital photo; near center of south line, SW1/4, SE1/4, Sec. 29, T.13S., R.5E., Geary Co., Kansas.

GE-210 = Matfield (upper Wymore shale, Kinney limestone, and Blue Springs shale) Shale and lower Barneston (Florence limestone) Limestone exposed in road cut on east side of Britt Road, with base of Florence limestone at 346 m (1135 ft); 5 m (17 ft) of Blue Springs shale with Kinney limestone at 341 m (1118 ft); Kinney limestone is thin-bedded, highly fossiliferous argillaceous carbonate overlain by a thin grayish mudrock with a thick bed of hard, dense limestone at top; two digital photos; approximately 200 ft west and 200 ft north of center of south line, NW1/4, Sec. 28, T.12S., R.5E. Geary Co., Kansas. NOTE: Section 111 of Mazzullo et al. (1977, pp. 185-186) reported the following thicknesses: Florence = 8 ft 5 inches, Blue Springs = 12 ft 3 inches, Kinney = 19 ft 6 inches, and Wymore = 8 ft 8 inches.

GE-211 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road ditch and in field east of Britt Road, with base of “rim rock” at 359 m (1178 ft); one digital photo; approximately 100 ft west of center of north line NW1/4, Sec. 28, T.12S., R.5E., Geary Co., Kansas.

GE-212 = Sand “borrow” pit south of Old U.S. Highway 40; one digital photo; approximately 175 ft south of north line, SE1/4, Sec. 20, T.12S., R.5E., Geary Co., Kansas.

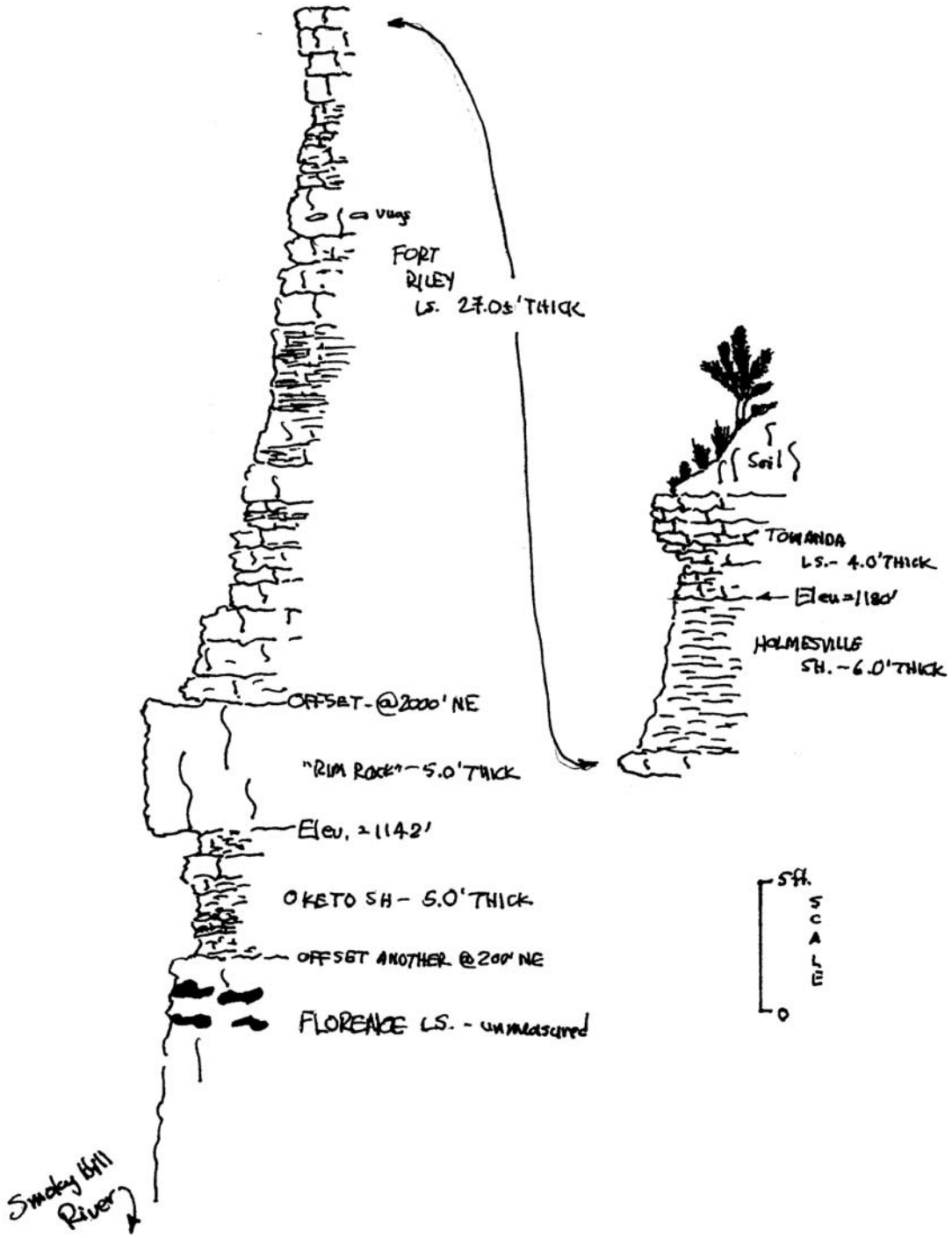
GE-213 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in ditch on west side of Crider Road just north of west-bound lane on Interstate Highway 70 (underpass), with base of “rim rock” at 346 m (1135 ft); one digital photo; approximately 450 ft south of northeast corner, Sec. 24, T.12S., R.4E., Geary Co., Kansas.

GE-214 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in west facing hillside north of Kansas Falls Road, with base of “rim rock” at 346 m (1135 ft); one digital photo; approximately 250 ft east and 125 ft north of center of south line, SW1/4, NE1/4, Sec. 24, T.12S., R.4E., Geary Co., Kansas.

GR-215 = Doyle (Towanda limestone) Shale exposed in new quarry, with base of Towanda limestone near 376 m (1235 ft); two digital photos; approximately 150 ft east and 300 ft south of center of west line, Sec. 5, T.13S., R.5E., Geary Co., Kansas.

GE-216 = Doyle (Holmesville shale and Towanda limestone) Shale and Barneston (Florence limestone, Oketo shale, and Fort Riley limestone) Limestone exposed along Smoky Hill River and in an old quarry face; see graphic section; base of “rim rock” at approximately 348 m (1142 ft) and base of Towanda limestone at approximately 360 m (1180 ft); three digital photos; just south of center of west line, SE1/4, SW1/4, NE1/4, Sec. 36, T.12S., R.4E., Dickinson Co., Kansas.

SITE GE-216 – KANSAS FALLS QUAD. – DICKINSON CO., KANSAS



WREFORD QUADRANGLE

Field was conducted during January–March of 2006.

GE- 145 Wreford (Threemile limestone) Limestone and Speiser Shale exposed in creek bank on south side of Clarks Creek Road, with base of Threemile limestone at 350 m (1150 ft); approximately 1.5 m (5 ft) of Threemile limestone and 3 m (10 ft) of Speiser Shale; one digital photo; approximately 150 ft west of center of NW1/4, Sec. 34, T.12S., R.6E., Geary Co., Kansas.

GE-146 = Matfield (Kinney limestone) Shale exposed in road cut on northwest side of Clarks Creek Road just southwest of Clarks Creek Road and Nelson Road junction, with base of Kinney limestone at 369 m (1211 ft); Kinney limestone also exposed in Nelson Road going north; one digital photo; approximately 900 ft west of northeast corner Sec. 4, T.13S., R6E., Geary Co., Kansas.

GE-147 = Wreford (Schroyer limestone) Limestone exposed in road cut on north side of Clarks Creek Road and in south bank of creek on west side of road, with top of Schroyer limestone 1.5 to 2 m (5 to 6 ft) thick at 363 m (1190 ft), 1± dm grainstone at top of Schroyer limestone; two digital photos; near center of NE1/4, Sec. 4, T.13S., R.6E., Geary Co., Kansas.

GE-148 = Wreford (Schroyer limestone and Havensville shale) Limestone exposed in road ditch on west side of Clarks Creek Road and in south bank of creek west of road, with base of Schroyer limestone at approximately 362 m (1187 ft); lower part approximately 2 m (6 ft) of Schroyer limestone is cherty with grainstone float blocks approximately 0.3 m (1 ft) thick in road ditch; sequence below the Schroyer limestone is mostly mudrock (Havensville shale), but there are two limestone beds each about 0.3 m (1 ft) thick separated by 0.3 m (1 ft) of mudrock near water level; three digital photos; approximately 100 ft east and 100 ft north of center of N1/2, N1/2, sec. 9, T.13S., R.6E., Geary Co., Kansas.

GE-148 (cont.)

GE-149 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both sides of road north of Salchow Cemetery west of Clarks Creek Road, with base of “rim rock” at 391 m (1282 ft); one digital photo; near center W1/2, Sec. 9, T.13S., R.6E., Geary Co., Kansas.

GE-150 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both sides of Hoff Road and in fields on both sides of road, with base of approximately 2 m (6 ft) thick “rim rock” at 393 m (1290 ft); one digital photo; near center of E1/2, Sec. 20, T.13S., R.6E., Geary Co., Kansas.

GE-151 = Matfield (Kinney limestone and Wymore shale) Shale exposed in west bank of Clarks Creek north of bridge, with Kinney limestone at 369 m (1210 ft); one digital photo; just south of center of SE1/4, NW1/4, Sec. 28, T.13S., R.6E., Geary Co., Kansas.

GE-152 = Matfield (Kinney limestone and Wymore shale) Shale exposed in east bank of Clarks Creek north of bridge, with Kinney limestone at 369 m (1210 ft); one digital photo; southeast corner, Sec. 29, T.13S., R.6E., Geary Co., Kansas.

GE-153 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in bluff on east side of Clarks Creek, with base of “rim rock” at 395 m (1295 ft); no photos; approximately 300 ft west of center of S1/2, NW1/4, Sec. 28, T.13S., R.6E., Geary Co., Kansas.

GE-157 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in drainage on both sides of Skiddy West Road, with base of “rim rock” at 381 m (1250 ft); one digital photo of exposure on south side of road; near center of south line of SE1/4, SW1/4, SW1/4, Sec. 26, T.13S., R.5E., Geary Co., Kansas.

GE-159 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in drainage on east side of Skiddy Road, with base of “rim rock” at 390 m (1280 ft); one digital photo; near center of NE1/4, NE1/4, Sec. 31, T.13S., R.6E., Geary Co., Kansas.

GE-160 = Barneston (Fort Riley limestone) Limestone exposed in road cut on east side of Skiddy Road, with upper Fort Riley limestone at 405 m (1330 ft); one digital photo; approximately 100 ft south of center of N1/2, Sec. 31, T.13S., R.6E., Geary Co., Kansas.

GE-161 = Barneston (Fort Riley limestone) Limestone exposed in road cut on north side of Hoff Road, with upper Fort Riley limestone at 405 m (1328 ft); one digital photo; center of Sec. 20, T.13S., R.6E., Geary Co., Kansas.

GE-162 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in drainage in field northeast of Red Road, with base of "rim rock" at 387 m (1270 ft); one digital photo; near center of SE1/4, SW1/4, SW1/4, Sec. 5, T.13S., R.6E., Geary Co., Kansas.

GE-163 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in road cuts on both side of Red Road, with base of "rim rock" at 392 m (1285 ft); one digital photo; near center of NE1/4, NE1/4, SE1/4, Sec. 17, T.13S, R.6E., Geary Co., Kansas.

GE-164 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road ditch on north side of Howard Road, with base of Florence limestone at 378 m (1240 ft); one digital photo; just east of center of NE1/4, NW1/4, SW1/4, Sec. 4, T.13S., R.6E., Geary Co., Kansas.

GE-165 = Barneston (Fort Riley limestone "rim rock") Limestone exposed along both sides of Howard Road, with base of "rim rock" at 390 m (1280 ft); one digital photo; just west of center of east line of Sec. 5, T.13S., R.6E., Geary Co., Kansas.

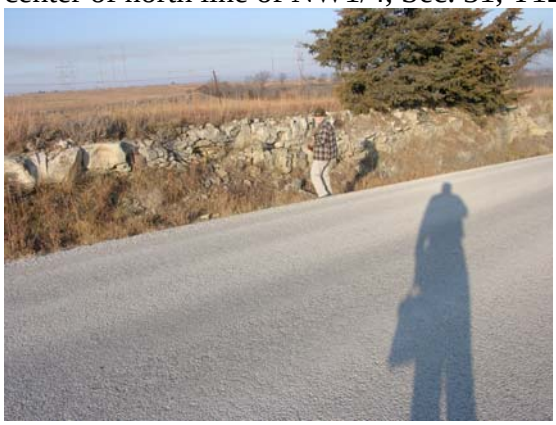
GE-166 = Barneston (Fort Riley limestone "rim rock") Limestone exposed along both sides of Nelson Road, with base of "rim rock" at 393 m (1290 ft); one digital photo; approximately 300 ft west of center of W1/2, SE1/4, Sec. 33, T.12S., R.6E., Geary Co., Kansas.

GE-167 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed along both sides of Old Stage Road, with base of “rim rock” at 387 m (1270 ft); one digital photo; approximately 200 ft north and 200 ft east of center of NW1/4, SW1/4, Sec. 21, T.12S., R.6E., Geary Co., Kansas.

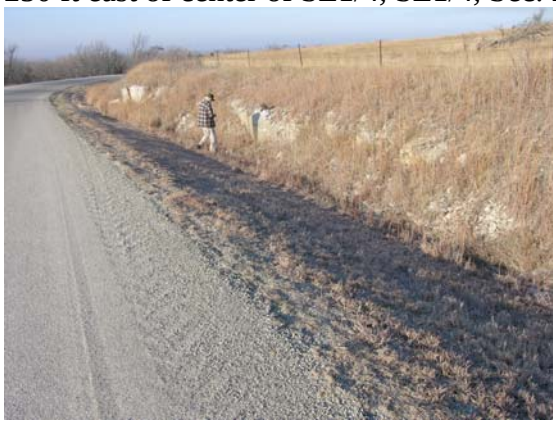
GE-168 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale well exposed in road cut on north side of Old Stage Road, with base of Florence limestone at 375 m (1230 ft); two digital photos; approximately 300 ft east and 200 ft south of center of S1/2, Sec. 21, T.12S., R.6E., Geary Co., Kansas.

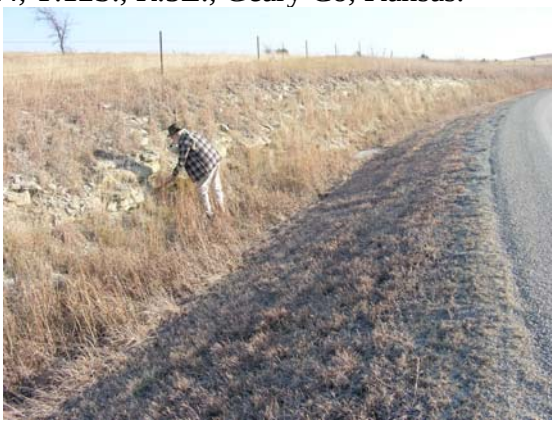
GE-169 = Wreford (Schroyer limestone) Limestone exposed in road on south side of old Stage Road, with top of Schroyer limestone at 361 m (1183 ft); one digital photo; near center of north line, NW1/4, NW1/4, NW1/4, Sec. 27, T.12S., R.6E., Geary Co., Kansas.

GE-170 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both sides of Skiddy Road with base of “rim rock” at 384 m (1260 ft); Barneston (Florence limestone and Oketo shale) Limestone exposed in road cut and bluff across the stream valley to the northeast; one digital photo; approximately 300 ft south of center of north line of NW1/4, Sec. 31, T12S., R.6E., Geary Co., Kansas.



GE-171 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on north side of Lyon Creek Road, with base of “rim rock” at 378 m (1240 ft); upper beds of Fort Riley limestone exposed up hill to the east; three digital photos; approximately 250 ft east of center of SE1/4, SE1/4, Sec. 24, T.12S., R.5E., Geary Co, Kansas.





GE-172 = Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale) Shale exposed in road cut on north side of Lyon Creek Road, with base of Florence limestone at 366 m (1200 ft); entire Barneston Limestone is exposed along the north side of the road but top is covered; one digital photo; near center of S1/2, SE1/4, Sec. 24, T.13S., R.5E., Geary Co., Kansas.

GE-173 = Barneston (Fort Riley limestone "rim rock") Limestone exposed on hillside on northeast side of Red Road, with base of "rim rock" at 375 m (1230 ft); Barneston (Florence limestone) Limestone exposed in road cut on southwest side of road at 366 m (1200 ft), top and base covered; one digital photo; approximately 300 ft east and 200 ft north of center of SE1/4, SE1/4, Sec. 12, T.13S., R.5E., Geary Co., Kansas.

GE-174 = Wreford (Schroyer limestone) Limestone exposed in road cut on east side of Otter Creek Road, with top of Schroyer limestone at 344 m (1130 ft); one digital photo; approximately 500 ft north of southeast corner, SW1/4, SE1/4, SW1/4, Sec. 2, T.13S., R.5E., Geary Co., Kansas.

GE-175 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in road cut on north side of Otter Creek Road, with base of “rim rock” at 381 m (1251 ft); one digital photo; approximately 150 ft north of southwest corner, SE1/4, SE1/4, SW1/4, Sec. 13, T.13S., R.5E., Geary Co., Kansas.

GE-176 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road and road cuts on both side of road, and in field west of road, with base of “rim rock” at 381 m (1251 ft); two digital photos; approximately 450 ft south of northeast corner, Sec. 23, T.13S., R.5E., Geary Co., Kansas.

GE-177 = Doyle (Holmesville shale and Towanda limestone) Shale, with Towanda limestone (base) exposed in road cut on west side of road at 397 m (1301 ft); red, gray, and green mudrocks of Holmesville shale exposed in road ditch south along road to near top of Barneston (Fort Riley limestone) Limestone at approximately 390 m (1280 ft) at a bench in road just before road turns west; two digital photos, one of Towanda limestone and one from bench in road; near center of east line, SE1/4, NE1/4, Sec. 23, T.13S., R.5E., Geary Co., Kansas.

GE-178 = Doyle (Towanda limestone) Shale exposed in road ditch on north side of Otter Creek Road, with base of Towanda limestone at 399 m (1310 ft); one digital photo; near center of south line, SE1/4, SW1/4, SE1/4, Sec. 13, T.13S., R.5E., Geary Co., Kansas.

GE-179 = Doyle (Towanda limestone) Shale exposed in road ditch on north side of Kansas Highway 157 at junction with U.S. Highway 77, with base of Towanda limestone at 397 m (1302 ft); one digital photo; southeast corner, Sec. 27, T.13S., R.5E., Geary Co., KS.

GE-180 = Winfield (Cresswell limestone and Grant shale) Limestone exposed in road cuts on both sides of Kansas Highway 157, with base of Cresswell limestone at 406 m (1331 ft); two digital photos; near center of south line, SW1/4, SE1/4, SE1/4, Sec. 28, T.13S., R.5E., Geary Co., Kansas.

GE-181 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in field east of road, with base of “rim rock” at 375 m (1229 ft); one digital photo; approximately 200 ft north and 250 ft west of center of SW1/4, NW1/4, Sec. 27, T.13S., R.5E., Geary Co., Kansas.

GE-182 = Barneston (Fort Riley limestone “rim rock,” Oketo shale, and Florence limestone) Limestone and Matfield (Blue Springs shale) Shale well exposed in spillway at Geary County State Lake, with base of “rim rock” at 377 m (1236 ft), and base of Florence limestone at 363 m (1193 ft); four digital photos; near center of N1/2, SW1/4, Sec. 22, T13S., R.5E., Geary Co., Kansas.

GE-186 = Winfield (Cresswell limestone and Grant shale) Limestone exposed in road cut on west side of U.S. Highway 77, with base of Cresswell limestone at 411 m (1348 ft); two digital photos; near center of east line, NE1/4, SE1/4, Sec. 34, T.13S., R5E., Geary Co., Kansas.

GE-187 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both sides of U.S. Highway 77, with base of “rim rock” at 381 m (1249 ft); one digital photo; near center of east line, NE1/4, Sec. 27, T.13S., R.5E., Geary Co., Kansas.

GE-188 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in drainage on west side of U.S. Highway 77, with base of “rim rock” at 375 m (1232 ft); one digital photo; approximately 150 ft east and 300 ft north of center of E1/2, NE1/4, Sec. 15, T.13S., R.5E., Geary Co., Kansas.

GE-189 = Barneston (Fort Riley limestone, Oketo shale, and Florence limestone) Limestone exposed in road cuts on west side of U.S. Highway 77, with base of “rim rock” at 375 m (1230 ft); one digital photo; approximately 150 ft east and 350 ft north of center NE1/4, NE1/4, Sec. 10, T.13S., R.5E., Geary Co., Kansas.

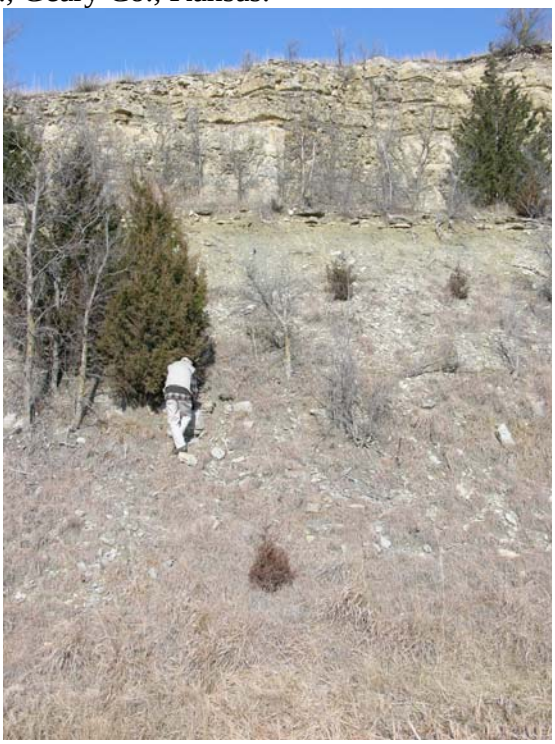
GE-190 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on east side of U.S. Highway 77 just south of bridge over Lyon Creek, with base of Florence limestone at 361 m (1185 ft); one digital photo; approximately 250 ft east of center SE1/4, Sec. 3, T. 13S., R.5E., Geary Co., KS.

GE-191 = Matfield (Blue Springs shale and Kinney limestone) Shale exposed in road cut on east side of U.S. Highway 77 just north of GE-190, with Kinney limestone at 350 m (1150 ft); one digital photo; approximately 150 ft east and 350 ft north of center SE1/4, Sec. 3, T.13S., R.5E., Geary Co., Kansas.

NOTE: GE-190 and GE-191 are within the area of section 110B by Mazzullo et al. (1977, p.183-185). This measured section is combined with another, 110A, and presented as a composite of exposures along U.S. Highway 77 from the NW1/4, Sec. 22 and SW1/4, Sec. 15, T.11S., R.5E.(110A) to the SE1/4 Sec. 3 and NE1/4 Sec. 10, T.13S., R.5E.(110B), Geary Co., Kansas.

GE-195 = Wreford (Schroyer limestone) Limestone exposed on west side of U.S. Highway 77 at junction with River Road, with top of Schroyer limestone at 338 m (1110 ft); one digital photo; approximately 175 ft east and 250 ft north of center S1/2, Sec. 27, T.12S., R.5E., Geary Co., Kansas. GE-195 is in the area of the type locality of the Wreford Limestone; the town of Wreford, Kansas, is approximately 1 mile southeast of this site.

GE-196 = Matfield (upper beds of Wymore shale, Kinney limestone, and Blue Springs shale) Shale through Barneston (Florence limestone, Oketo shale, and Fort Riley limestone "rim rock") Limestone well exposed in road cut on east side of U.S. Highway 77, with base of "rim rock" at 366 m (1200 ft), base of Florence limestone at 356 m (1168 ft), and Kinney limestone at 349 m (1145 ft); hand leveled 0.5 m (1.5 ft) of Kinney and 7 m (23 ft) of Blue Springs shale; two digital photos; approximately 250 ft west of center, SE1/4, SE1/4, Sec. 34, T.12S., R.5E., Geary Co., Kansas.



GE-209 = Matfield (Kinney limestone) Shale exposed in parking lot excavation of Grocery Supply Company (temporary exposure), with Kinney limestone at approximately 341 m (1120 ft); one digital photo; approximately 150 ft west and 125 ft north of center of north line SE1/4, NW1/4, Sec. 22, T.12S., R.5E., Geary Co., Kansas.

WHITE CITY NW QUADRANGLE

Field was conducted during January–March of 2006.

G-1 = J-71 = Sequence from Barneston (Fort Riley limestone) Limestone to Doyle (Towanda limestone) Shale; near center of west line of Sec. 33, T.13S., R.7E., Geary Co., Kansas; date and author unknown, but probably is J. M. Jewett in the late 1930s as this site is in Jewett, 1941.

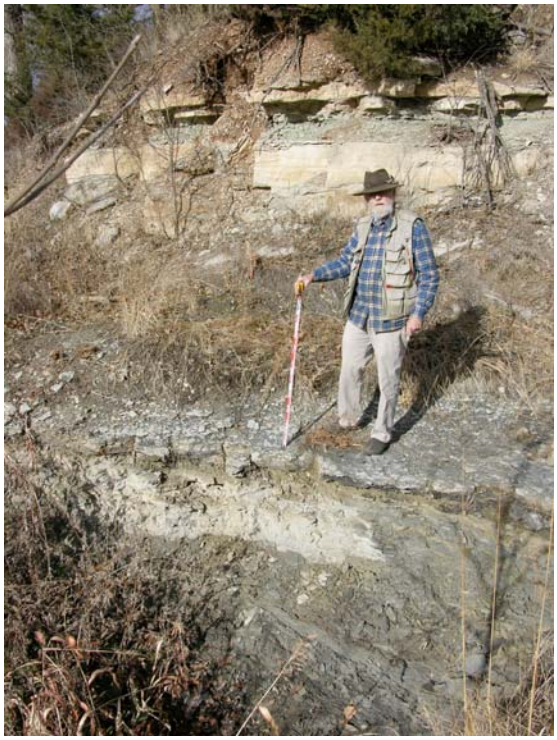
G-2 = J-70 = Sequence from Speiser Shale into Wreford (Threemile limestone) Limestone; center of south line, Sec. 34, T.12S., R.7E., Geary Co., Kansas; date and author unknown, but probably is J. M. Jewett in the late 1930s as this site is in Jewett, 1941. NOTE: This site is probably incorrectly located as the stratigraphy is incorrect; we suspect the Range should be 6E rather than 7E.

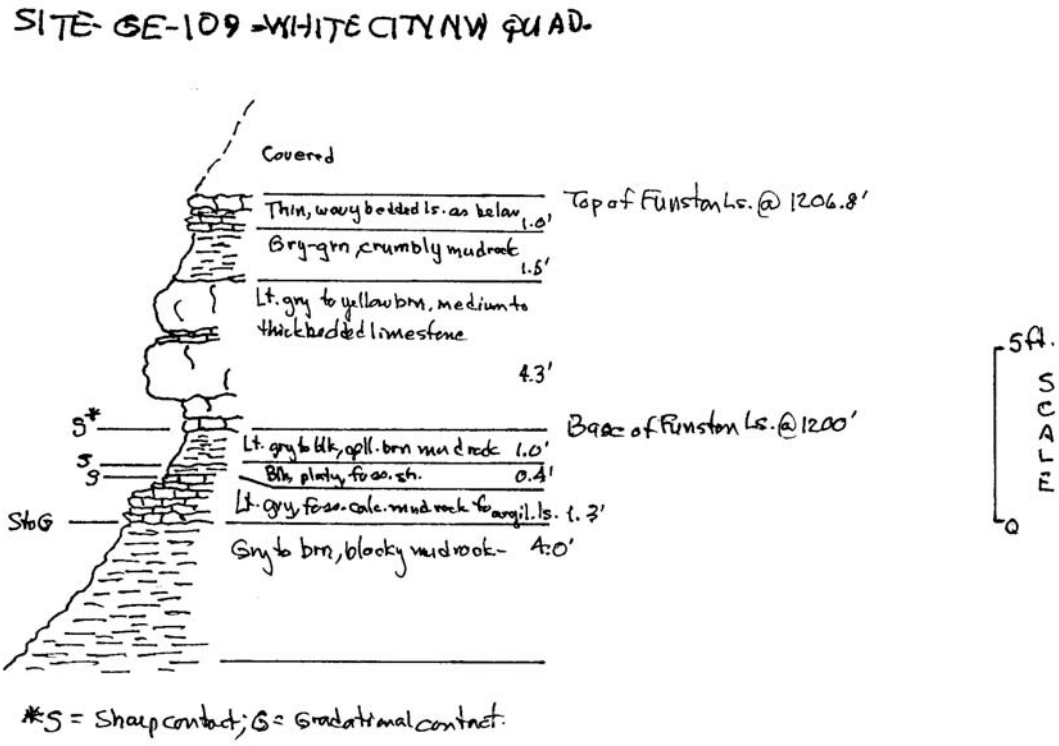
GE-69 = Matfield (Kinney limestone) Shale exposed in road cut on east side of road;, Kinney limestone at 396 m (1300 ft); one digital photo; approximately 100 ft north of center of south line, SE1/4, SW1/4, NW1/4, Sec. 35, T.12S., R.7E., Geary Co., Kansas.

GE-107 = Wreford (Threemile limestone) Limestone exposed in road cut on east side of Humboldt Creek Road just south of bridge over drainage, with base of Threemile limestone at 390 m (1280 ft); one digital photos; near center of SW1/4, NE1/4, SW1/4, Sec. 21, T.12S., R.7E., Geary Co., Kansas.

GE-108 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on north side of Schmedemann Road, with “rim rock” at 422 m (1385 ft); one digital photo; approximately 200 ft north and 100 ft west of center of NE1/4, NW1/4, Sec. 35, T.12S., R.7E., Geary Co., Kansas.

GE-109 = Blue Rapids Shale and Funston Limestone exposed in road cut on north side of Zumbrunn Road just east of low water bridge, with base and top of Funston Limestone at 366 m (1200 ft) and 368 m (1206.8 ft) respectively; see graphic section; one digital photo; near center of NW1/4, SW1/4, NE1/4, Sec. 28, T.12S., R.7E., Geary Co., Kansas.





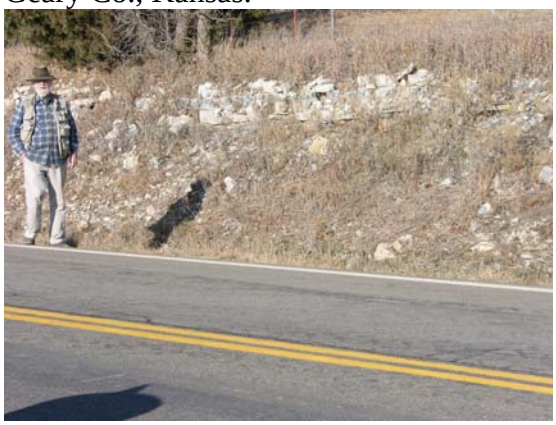
GE-110 = Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale) Shale exposed in road cut on north side of Zumbrunn road, with base of Florence limestone at 398 m (1305 ft); one digital photo; near center of W1/2, Sec. 28, T.12S., R.7E., Geary Co., Kansas.

GE-111 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in ditch and road cut on north side of Ridge Road, with base of “rim rock” at 401m (1315 ft); one digital photo; approximately 200 ft north of center of N1/2, NE1/4, Sec. 30, T.12S., R.7E., Geary Co., Kansas.

GE-112 = Base of Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale) Shale exposed in road and road cut on north side of Ridge Road, with base of Florence limestone at 390 m (1280 ft); one digital photo; center NW1/4, NE1/4, Sec. 30, T.12S., R.7E., Geary Co., Kansas.

GE-113 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cut on east side of Kansas Highway 57, with base of Threemile limestone at 358 m (1175 ft); one digital photo; approximately 300 ft north of center of SE1/4, SE1/4, Sec.23, T.12S., R.6E., Geary Co., Kansas.

GE-114 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cut on east side of Kansas Highway 57, with base of Threemile limestone at 359 m (1178 ft); one digital photo; near center of NE1/4, NW1/4, Sec. 25, T.12S., R.6E., Geary Co., Kansas.



GE-115 = Matfield (Kinney limestone) Shale exposed in road cut on east side of Kansas Highway 57, with top of Kinney limestone at 393 m (1290 ft); one digital photo; near center of south line, NE1/4, SE1/4, SE1/4, Sec. 8, T.12S., R.7E., Geary Co., Kansas.

GE-116 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale well exposed in road cut on northeast side of Kansas Highway 57, with base of Florence limestone at 411 m (1348 ft); one digital photo; near center of S1/2, Sec. 15, T.13S. R.7E, Geary Co., Kansas.

GE-117 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale well exposed in road cut on northeast side of Kansas Highway 57, with base of Florence limestone at 411 m (1347 ft); one digital photo; near center of south line, SW1/4, SE1/4, Sec. 15., T.13S., R.7E., Geary Co., Kansas.

GE-118 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in road cut on north side of Kansas Highway 57, with top of “rim rock” at 427 m (1400 ft); one digital photo; approximately 250 ft east and 200 ft south of center of NE1/4, Sec. 22, T.13S., R.7E., Geary Co., Kansas.

GE-119 = Doyle (limestone in Holmesville shale) Shale exposed in Ridge Road above Barneston (Fort Riley limestone) Limestone, with limestone in Holmesville at 434 m (1425 ft); one digital photo; approximately 200 ft east of center of E1/2, NE1/4, Sec. 10, T.13S., R.7E., Geary Co., Kansas.

GE-120 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in road ditch on north side of North Carr Road, with base of “rim rock” at 421 m (1380 ft); one digital photo; center west line, NW1/4, Sec. 10, T.13S., R.7E., Geary Co., Kansas.

WHITE CITY NW QUADRANGLE

Field work was conducted during January–March of 2006.

G-1 = J-71 = Barneston (Fort Riley limestone) Limestone to Doyle (Towanda limestone) Shale; near center of west line of Sec. 33, T.13S., R.7E., Geary Co., Kansas; date and author unknown, but probably is J. M. Jewett in the late 1930s as this site is in Jewett, 1941.

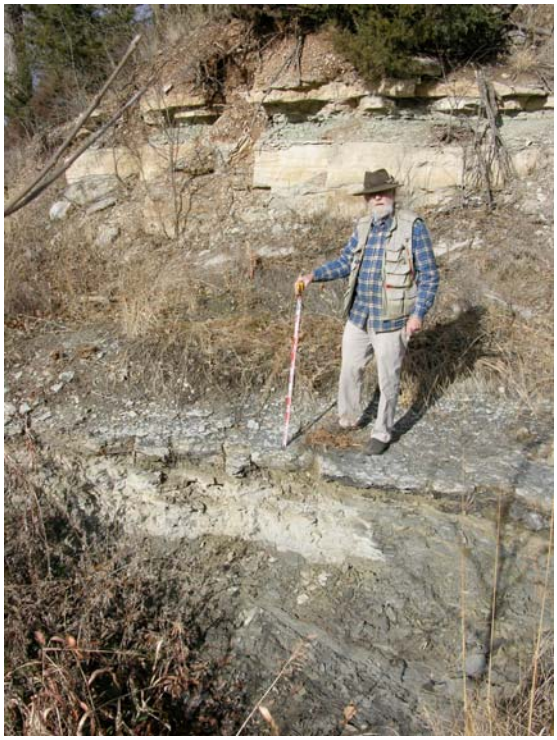
G-2 = J-70 = Speiser Shale to Wreford (Threemile limestone) Limestone; center of south line, Sec. 34, T.12S., R.7E., Geary Co., Kansas; date and author unknown, but probably is J. M. Jewett in the late 1930s as this site is in Jewett, 1941. NOTE: This site is probably incorrectly located because the stratigraphy is wrong, we suspect the Range should be 6E rather than 7E.

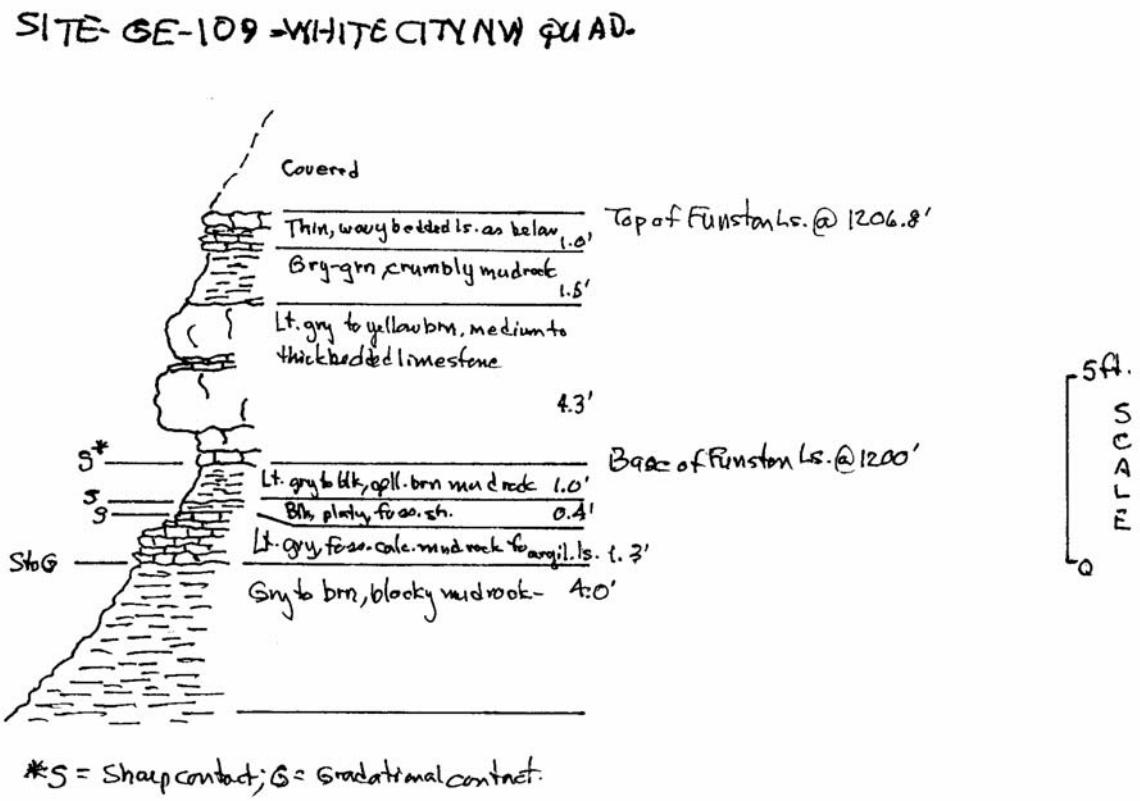
GE-69 = Matfield (Kinney limestone) Shale exposed in road cut on east side of road, Kinney limestone at 396 m (1300 ft); one digital photo; approximately 100 ft north of center of south line, SE1/4, SW1/4, NW1/4, Sec. 35, T.12S., R.7E., Geary Co., Kansas.

GE-107 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cut on east side of Humboldt Creek Road just south of bridge over drainage, with base of Threemile limestone at 390 m (1280 ft); one digital photo; near center of SW1/4, NE1/4, SW1/4, Sec. 21, T.12S., R.7E., Geary Co., Kansas.

GE-108 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on north side of Schmedemann Road, with “rim rock” at 422 m (1385 ft); one digital photo; approximately 200 ft north and 100 ft west of center of NE1/4, NW1/4, Sec. 35, T.12S., R.7E., Geary Co., Kansas.

GE-109 = Blue Rapids Shale and Funston Limestone exposed in road cut on north side of Zumbrunn Road just east of low-water bridge, with base and top of Funston Limestone at 366 m 1200 ft) and 368 m (1206.8 ft) respectively; see graphic section; one digital photo; near center of NW1/4, SW1/4, NE1/4, Sec. 28, T.12S., R.7E., Geary Co., Kansas.





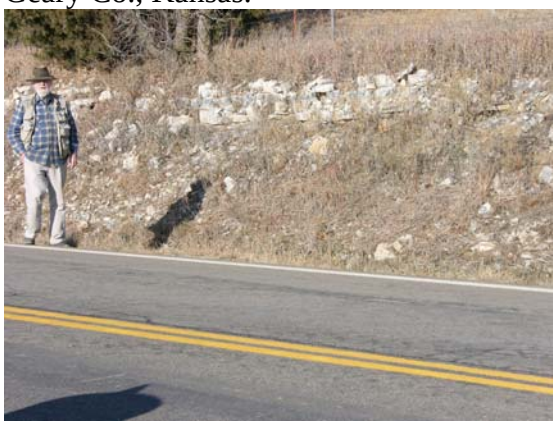
GE-110 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on north side of Zumbrunn road, with base of Florence limestone at 398 m (1305 ft); one digital photo; near center of W1/2, Sec. 28, T.12S., R.7E., Geary Co., Kansas.

GE-111 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in ditch and road cut on north side of Ridge Road, with base of “rim rock” at 401 m (1315 ft); one digital photo; approximately 200 ft north of center of N1/2, NE1/4, Sec. 30, T.12S., R.7E., Geary Co., Kansas.

GE-112 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road and road cut on north side of Ridge Road, with base of Florence limestone at 390 m (1280 ft); one digital photo; center NW1/4, NE1/4, Sec. 30, T.12S., R.7E., Geary Co., Kansas.

GE-113 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cut on east side of Kansas Highway 57, with base of Threemile limestone at 358 m (1175 ft); one digital photo; approximately 300 ft north of center of SE1/4, SE1/4, Sec. 23, T.12S., R.6E., Geary Co., Kansas.

GE-114 = Wreford (Threemile limestone) Limestone and upper Speiser Shale exposed in road cut on east side of Kansas Highway 57, with base of Threemile limestone at 359 m (1178 ft); one digital photo; near center of NE1/4, NW1/4, Sec. 25, T.12S., R.6E., Geary Co., Kansas.



GE-115 = Matfield (Kinney limestone) Shale exposed in road cut on east side of Kansas Highway 57, with top of Kinney limestone at 393 m (1290 ft); one digital photo; near center of south line, NE1/4, SE1/4, SE1/4, Sec. 8, T.12S., 7E., Geary Co., Kansas.

GE-116 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale well exposed in road cut on northeast side of Kansas Highway 57, with base of Florence limestone at 411 m (1348 ft): one digital photo; near center of S1/2, Sec. 15, T.13S., R.7E, Geary Co., Kansas.

GE-117 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale well exposed in road cut on northeast side of Kansas Highway 57, with base of Florence limestone at 411 m (1347 ft): one digital photo; near center of south line, SW1/4, SE1/4, Sec. 15., T.13S., R.7E., Geary Co., Kansas.

GE-118 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in road cut on north side of Kansas Highway 57, with top of “rim rock” at 427 m (1400 ft); one digital photo; approximately 250 ft east and 200 ft south of center of NE1/4, Sec. 22, T.13S., R.7E., Geary Co., Kansas.

GE-119 = Limestone exposed in Ridge Road above Barneston (Fort Riley limestone) Limestone, possibly the upper beds of Fort Riley limestone at 434 m (1425 ft); one digital photo; approximately 200 ft east of center of E1/2, NE1/4, Sec. 10, T.13S., R.7E., Geary Co., Kansas.

GE-120 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in road ditch on north side of North Carr Road, with base of “rim rock” at 421 m (1380 ft); one digital photo; center west line, NW1/4, Sec. 10, T.13S., R.7E., Geary Co., Kansas.

GE-121 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on west side of South Carr Road, with base of Florence limestone at 402 m (1320 ft); one digital photo; near center of NE1/4, SE1/4, NE1/4, Sec. 17, T.13S., R.7E., Geary Co., Kansas.

GE-122 = Barneston Limestone (nearly complete to base of Fort Riley limestone "rim rock") and Matfield (Blue Springs shale) Shale exposed in road ditch on west side of South Carr road, with base of "rim rock" at 420 m (1377 ft); one digital photo; near center of SE1/4, SE1/4, NE1/4, Sec. 17, T.13S., R.7E., Geary Co., Kansas.

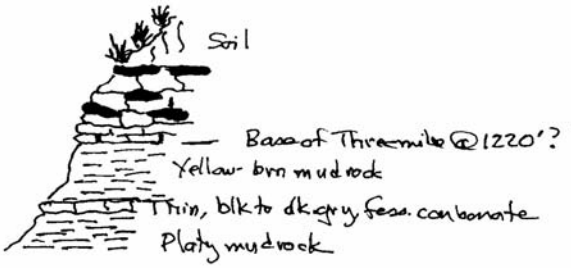
GE-123 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in Stahl Road and field east of Stahl Road, with base of "rim rock" at 432 m (1418 ft); one digital photo; near center of west line, SW1/4, Sec. 26, T.13S., R.7E., Geary Co., Kansas.

GE-124 = Wreford (Schroyer limestone) Limestone exposed in road cut on north side of Davis Creek Road, with probable base of Schroyer limestone at 367 m (1203 ft); one digital photo; approximately 200 ft south of center of SW1/4, NE1/4, Sec. 2, T.13S., R.6E., Geary Co., Kansas.

GE-125 = Wreford (Schroyer limestone) Limestone exposed in creek bank on west side of Davis Creek Road, with base of Schroyer limestone at 372 m (1220 ft); one digital photo; approximately 200 ft west and 250 ft north of center of S1/2, Sec. 12, T.13S., R.6E., Geary Co., Kansas. CORRECTION: In graphic section below, the base of the Schroyer is at 1220 ft, not the Threemile.

SITE-GE-125-WHITE CITY NW QUAD.

Rough field sketch - not to scale



GE-126 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in hillside on east side of Davis Creek Road, with base of Florence limestone at 392 m (1285 ft); one digital photo; approximately 300 ft east of center of NE1/4, Sec. 13, T.13S., R.6E., Geary Co., Kansas.

GE-127 = Barneston (Fort Riley limestone “rim rock” and upper beds) Limestone exposed in road, with “rim rock” at 410 m (1345 ft); “rim rock” is conspicuous on the landscape; one digital photo; near center of south line, Sec. 18, T.13S., R.7E., Geary Co., Kansas.

GE-128 = Barneston (Florence limestone) Limestone poorly exposed in road ditch along north side of road, with base of Florence limestone at 398 m (1305 ft); one digital photo; approximately 200 ft south of center of north line of NE1/4, NE1/4, NW1/4, Sec. 19, T.13S., R.7E., Geary Co., Kansas.

GE-129 = Base of Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale and Kinney limestone) Shale well exposed in a road cut on east side of Davis Creek Road, with base of Florence limestone at 393 m (1290 ft); one digital photo; approximately 300 ft south and 200 ft west of center of W1/2, SW1/4, Sec. 19, T.13S., R.7E., Geary Co., Kansas.

GE-130 = Barneston (Florence limestone, Oketo shale, and Fort Riley limestone “rim rock” clearly visible) Limestone in bluff in east bank of Davis Creek on west side of Davis Creek Road, with estimated base of Florence limestone at 401 m (1315 ft); one digital photo; approximately 300 ft south and 200 ft west of center of W1/2, SW1/4, Sec. 19, T.13S., R.7E., Geary Co., Kansas.

GE-131 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale well exposed in road cut on east side of Davis Creek Road, with base of Florence limestone at 402 m (1318 ft); one digital photo; just south of center of north line of NW1/4, NW1/4, SE1/4, Sec. 30, T.13S., R.7E., Geary Co., Kansas.

GE-132 = Base of Barneston (Fort Riley limestone “rim rock,” Oketo shale, and upper Florence limestone) Limestone well exposed in road cut on north side of Davis Creek Road, with base of “rim rock” at 407 m (1355 ft); one digital photo; approximately 100 ft north of center of south line of SE1/4, SE1/4, Sec. 30, T.13S., R.7E., Geary Co., Kansas.

GE-133 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Davis Creek Road, with base of Towanda limestone at 433 m (1422 ft); one digital photo; near center of west line, NW1/4, SW1/4, NW1/4, Sec. 33, T.13S., R.7E., Geary Co., Kansas.

GE-134 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Davis Creek Road, with base of Towanda limestone at 433 m (1422), near G-1 and J-71; one digital photo; approximately 400 ft south of center of west line of W1/2, Sec. 33, T.13S., R.7E., Geary Co., Kansas.

GE-136 = Doyle (Towanda limestone) Shale exposed in road cuts on both sides of Davis Creek Road, with base of Towanda limestone at 433 m (1420 ft); two digital photos; near center of north line, NE1/4, NW1/4, NE1/4, Sec. 32, T.13S., R.7E., Geary Co., Kansas.

GE-137 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in stream bank just east of Hunt Road, with base of Florence limestone at 408 m (1338 ft); one digital photo; approximately 300 ft east of center of SW1/4, NW1/4, Sec. 32, T.13S., R.7E., Geary Co., Kansas.

GE-138 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road ditch on South Road, with base of Florence limestone at 400 m (1313 ft); one digital photo; near center of NE1/4, NW1/4, NE1/4, Sec. 25, T.13S., R.7E., Geary Co., Kansas.

GE-139 = Base of Barneston (Fort Riley limestone “rim rock”) in road cuts on both sides of Thomas Creek Road, with base of “rim rock” at 411 m (1348 ft); one digital photo; near center of north line, Sec. 25, T.13S., R.7E., Geary Co., Kansas.

GE-141 = Barneston (upper Fort Riley limestone and Oketo shale) Limestone exposed in road cut on north side of Thomas Creek Road, base of “rim rock” at 407 m (1335 ft); one digital photo; near center of north line, NW1/4, NE1/4, Sec. 26, T.13S., R.7E., Geary Co., Kansas.

GE-142 = Barneston (upper Fort Riley limestone, Oketo shale, and Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut/bluff on north side Thomas Creek Road near where road crosses Thomas Creek, with base of Florence limestone at 391 m (1280 ft); one digital photo; near center of NW1/4, NW1/4, NE1/4, Sec. 26, T.13S., R.7E., Geary Co., Kansas.

GE-143 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in Thomas Creek Road and field north of road, with base of "rim rock" at 404 m (1324 ft); one digital photo; near center of north line, NW1/4, Sec. 26, T.13S., R.7E., Geary Co., Kansas.

GE-144 = Wreford (Schroyer limestone and Havensville shale) Limestone exposed in road cut on east side of Thomas Creek Road, with base of Schroyer limestone at 357 m (1170 ft); one digital photo; approximately 200 ft south of center of N1/2, SW1/4, Sec. 2, T.13S., R.6E., Geary Co., Kansas.

WHITE CITY NE QUADRANGLE

Field work was conducted during January–March of 2005.

G-13 = Wreford Limestone along Humboldt Creek; Sec. 12, T.13S., R.7E., Geary Co., Kansas; probably measured and described by Jewett, undated.

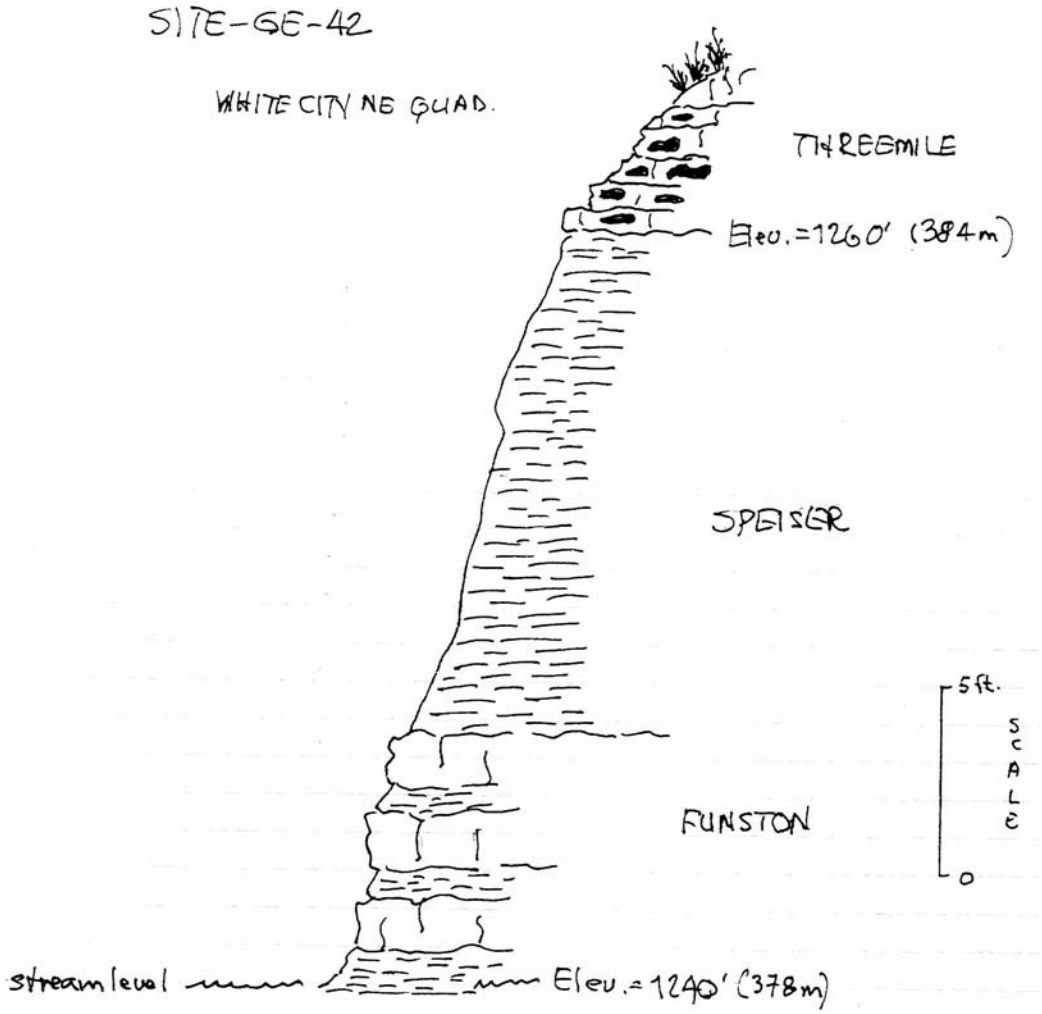
GE-4 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in south bank of drainage along a road cut of west side of Kansas Highway 177, with base of Florence limestone at 433 m (1420 ft); one digital photo; approximately 0.05 mile north of center of west line, Sec. 22, 13S., R.8E., Geary Co., Kansas.

GE-5 = Barneston (Florence limestone) Limestone exposed in road cut on east side of Kansas Highway 177, with top of Florence limestone at 446 m (1465 ft); one digital photo; near northwest corner Sec. 22, T.13S., R.8E., Geary Co., Kansas.

GE-6 = Base of Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road cut on west side of Kansas Highway 177, with base of Florence limestone at 439 m (1440 ft); one digital photo; approximately 0.2 mile south of northeast corner Sec. 16, T.13S., R.8E., Geary Co., Kansas.

GE-7 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cut on east side of Kansas Highway 177, with “rim rock” at 442 m (1450 ft); two digital photos; approximately 0.2 mile north of center of west line, Sec. 27, T.12S., R.8E., Geary Co., Kansas.

GE-42 = Wreford (Threemile limestone) Limestone, Speiser Shale, and Funston Limestone exposed in east-facing stream cut on MacArthur Road west of Florence Road, with base of Threemile limestone at approximately 384 m (1260 ft) and Funston Limestone at 378 m (1240 ft); stream level is 378 m (1240 ft); see graphic section; one digital photo; approximately 1000 ft west of center of Sec. 19, T.12S., R.8E., Geary Co., Kansas.



GE-43 = Matfield (Blue Springs shale, Kinney limestone, and Wymore shale) Shale well exposed in road cut just south of old quarry on east side of Florence Road, with top of Kinney limestone at approximately 408 m (1340 ft); two digital photos, one of road cut and one of north face of old quarry; approximately 1500 ft west of center of east line of Sec. 30, T.12S., R.8E., Geary Co., Kansas.

GE-44 = Wreford (Schroyer limestone) Limestone exposed in road ditch on east side of Florence Road (cherty beds of Schroyer limestone in north bank of stream; good oolitic limestone and oomoldic porosity in upper Schroyer limestone), with top of Schroyer limestone at 399 m (1310 ft); one digital photo; approximately 1700 ft northwest of southeast corner, Sec. 19, T.12S., R.8E., Geary Co., Kansas.

GR-45 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both sides of Lower McDowell Road, with “rim rock” at approximately 432 m (1418 ft); one digital photo; approximately 700 ft east of center of south line, Sec. 30, T.12S., R.8E., Geary Co., Kansas.

GE-46 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road ditch on south side of Lower McDowell Road, with base of Florence limestone at approximately 423 m (1387 ft); two digital photos; approximately 2500 ft west of southeast corner, Sec. 30, T.12S., R.8E., Geary Co., Kansas.

GE-47 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in hillside north of Lower McDowell Road, with base of Florence limestone at 430 m (1410 ft); one digital photo; near center of south line, SE1/4, Sec. 29, T.12S., R.8E., Geary Co., Kansas.

GE-48 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road ditch (drainage) on east side of Old Kansas Highway 18, with base of Florence limestone at 430 m (1410 ft); one digital photo; near center of east line, Sec. 32, T.12S., R.8E., Geary Co., Kansas.

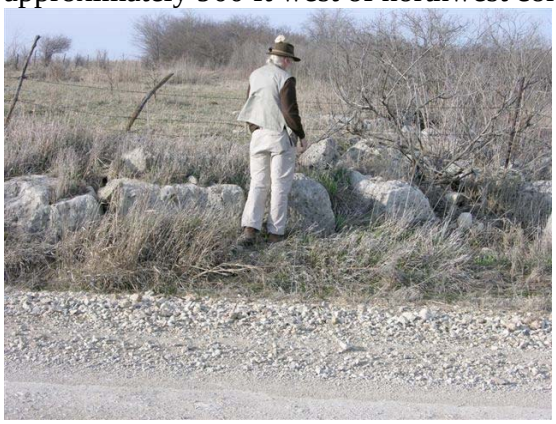
GE-49 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road ditch on east side of Old Kansas Highway 18, with “rim rock” at approximately 446 m (1462 ft); one digital photo; near center of east line, NE1/4, SE1/4, Sec. 5, T.12S., R.8E., Geary Co., Kansas.

GE-50 = Barneston (Fort Riley limestone “rim rock” and Oketo shale) Limestone exposed in south bank of stream on west side of Humboldt Creek Road, with “rim rock” at 411 m (1439 ft); one digital photo; approximately 1000 ft north of southeast corner Sec. 30, T.123S., R.8E., Geary Co., Kansas.

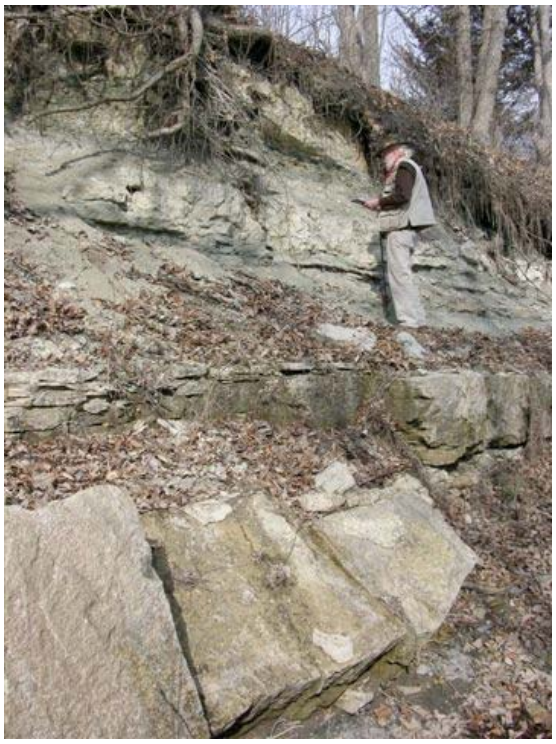
GE-51 = Barneston (Fort Riley limestone “rim rock”) Limestone (clayey, calcareous beds below) exposed in road cut on west side of Cutoff Road, with “rim rock” at 439 m (1442 ft); one digital photo; approximately 2300 ft east of southwest corner Sec. 30, T.13S., R.8E., Geary Co., Kansas.

GE-52 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in road cuts on both side of Cutoff Road, with “rim rock” at approximately 442 m (1450 ft); one digital photo; approximately 2400 ft west of southeast corner Sec. 30, T.13S., R.8E., Geary Co., Kansas.

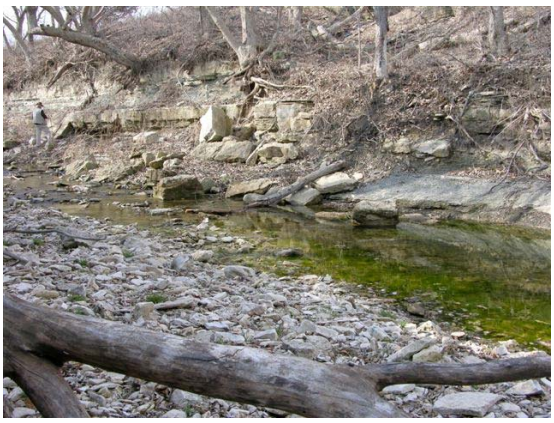
GE-53 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in pastures on both side of Garanson Road, with “rim rock” at approximately 433 m (1420 ft); one digital photo; approximately 900 ft west of northwest corner Sec. 30, T.13S., R.8E., Geary Co., Kansas.

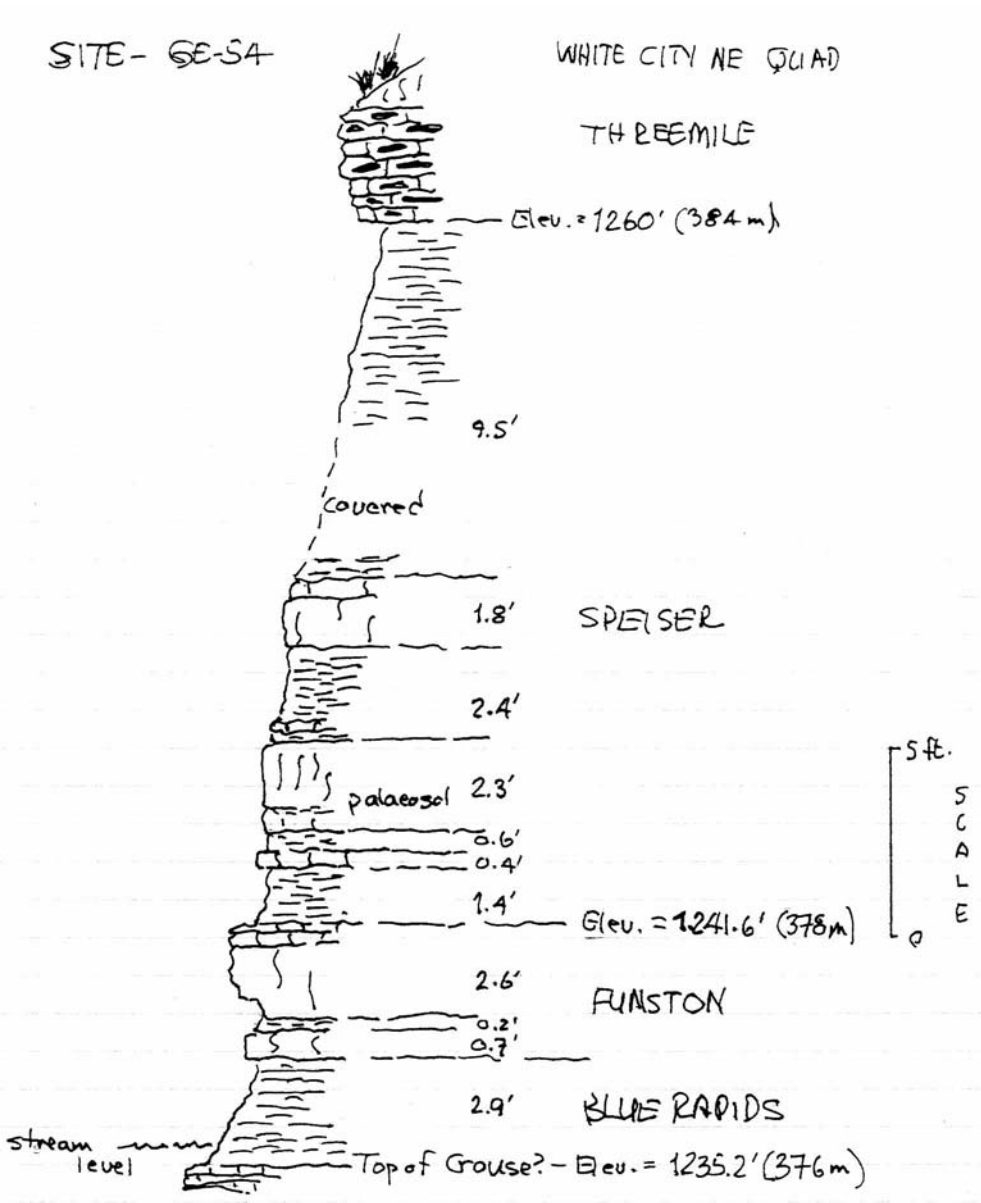


GE-54 = Wreford (Threemile limestone) Limestone and Speiser Shale exposed in road cut on west side of Lower McDowell Road, with base of Threemile limestone at 384 m (1260 ft); across road in west bank of Thierer Branch, the Funston Limestone, Blue Rapids Shale, and upper beds of Crouse Limestone are exposed just below water level (see graphic section); five digital photos: one of Threemile limestone “rim rock,” one of Speiser Shale, and three of interval in stream bank; near center of NE1/4, SE1/4, Sec. 24, T.12S., R.7E., Geary Co., Kansas.



GE-54 (cont.)



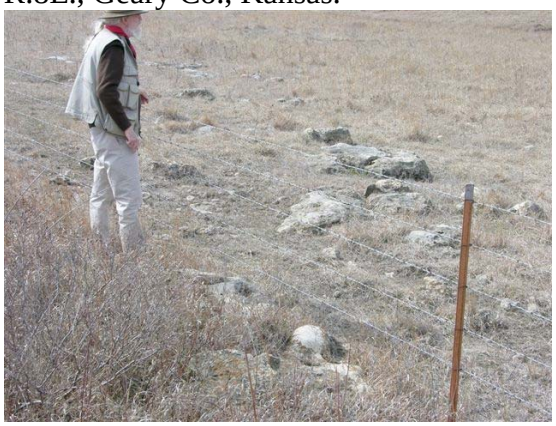

SITE - GE-S4
WHITE CITY NE QUAD
THREEMILE
Elev. = 1260' (384 m)
9.5'
covered
1.8'
SPEISER
2.4'
palaeosol
2.3'
0.6'
0.4'
1.4'
Elev. = 1241.6' (378m)
2.6'
FUNSTON
0.2'
0.7'
2.9'
BLUE RAPIDS
stream level
Top of Grouse? - Elev. = 1235.2' (376m)
5 ft.
0
SCALE

GE-56 = Wreford (Threemile limestone and Havensville shale) Limestone; above the cherty beds of the Threemile limestone, the Havensville shale is composed of approximately 0.5 m (1.5 ft) of mudrock and 1.5 m (5 ft) of skeletal carbonate. Exposed in hog lot of Florence farm east of Lower McDowell Road; four digital photos; approximately 900 ft northeast of southeast corner Sec. 24, T.12S., R.7E., Geary Co., Kansas.

GE-57 = Wreford (Schroyer limestone) Limestone exposed in road ditch on east side of Lower McDowell Road, with top of Schroyer limestone at 395 m (1297 ft); one digital photo; approximately 1900 ft southeast of northwest corner Sec. 30, T.12S., R.8E., Geary Co., Kansas.

GE-58 = Matfield Shale exposed in road cut on east side of Lower McDowell Road, with Kinney limestone at 412 m (1350 ft); one digital photo; approximately 2300 ft east of southwest corner Sec. 30, T.12S., R.8E., Geary Co., Kansas.

GE-59 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in pastures on both sides of Pepperhill Road, best exposure of “rim rock on west side of road at 435 m (1428 ft); one digital photo; just north of center of southwest corner Sec. 31, T.12S., R.8E., Geary Co., Kansas.



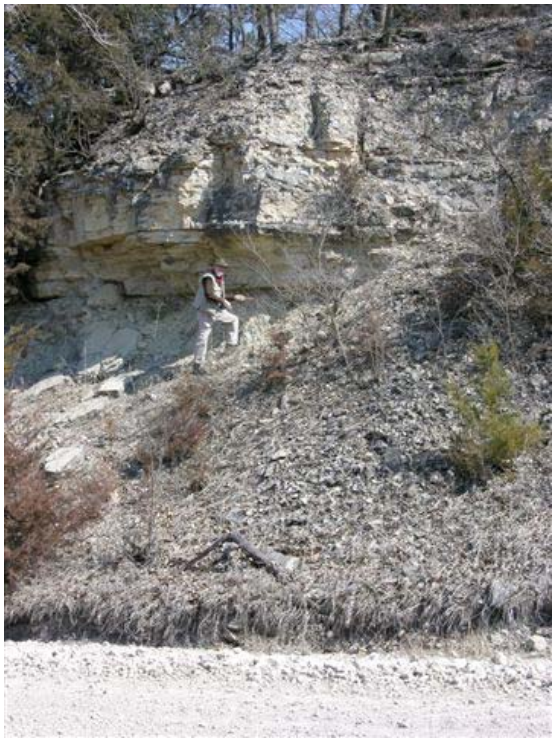
GE-60 = Barneston (Fort Riley limestone “rim rock”) Limestone exposed in pasture north of Rosey Loop Road at 428 m (1405 ft); one digital photo; approximately 3500 ft east of southwest corner Sec. 31, T.12S., R.8E., Geary Co., Kansas.

GE-61 = Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale) Shale exposed in road cut on south side of Rosey Loop Road, with base of Florence limestone at 414 m (1360 ft)); one digital photo; approximately 2400 ft east of southwest corner Sec. 31, T.12S., R.8E., Geary Co., Kansas.

GE-62 = Barneston (Fort Riley limestone) Limestone road ditch on east side of road, with "rim rock" at 445 m (1460 ft); one digital photo; southwest corner Sec. 8, T.12S., R.8E., Geary Co., Kansas.

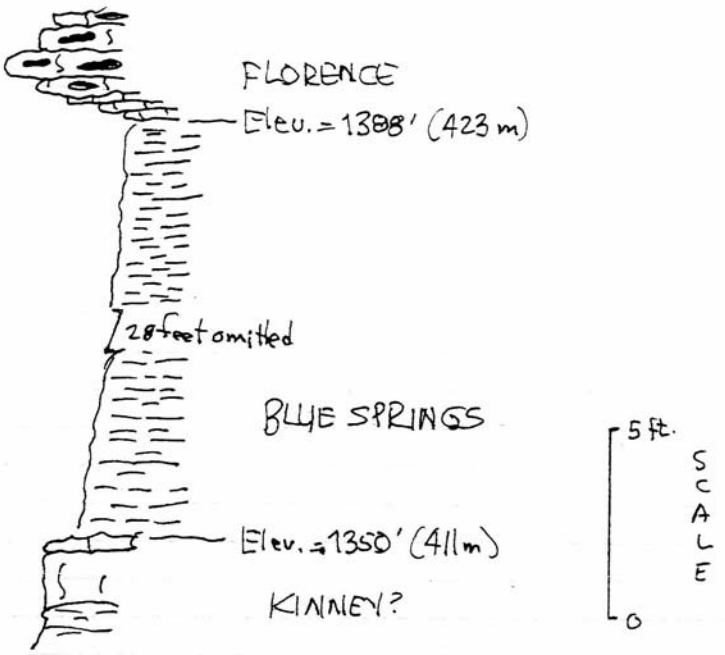
GE-63 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in Edwards Road and pasture, with "rim rock" at approximately 433 m (1420 ft)); one digital photo; approximately 2700 ft southeast of northwest corner Sec. 18, T.13S., R.8E., Geary Co., Kansas.

GE-64 = Barneston (Florence limestone) Limestone exposed in road cut on south side of Edwards Road, with base of Florence limestone at 419 m (1370 ft); two digital photos; approximately 2400 ft east of northwest corner Sec. 18, T.13S., R.8E., Geary Co., Kansas.

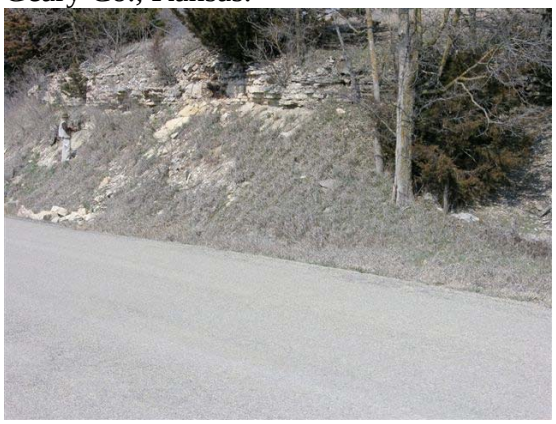


GE-65 = Barneston (Florence limestone) Limestone and Matfield (Blue Rapids shale and Kinney limestone) Shale exposed in road cut on north side of Humboldt Creek Road, with base of Florence limestone at 423 m (1388 ft); top of a thick, 0.5-m (1.6-ft) limestone bed (Kinney limestone) in creek 12 m (38 ft) below base of Barneston Limestone at 412 m (1350 ft); elevation of creek bed is approximately 405 m (1330 ft); see graphic section; three digital photos; approximately 4300 ft east of northwest corner Sec. 18, T.13S., R.8E., Geary Co., Kansas.

SITE- 95-65 ~ WHITE CITY NE QUAD.

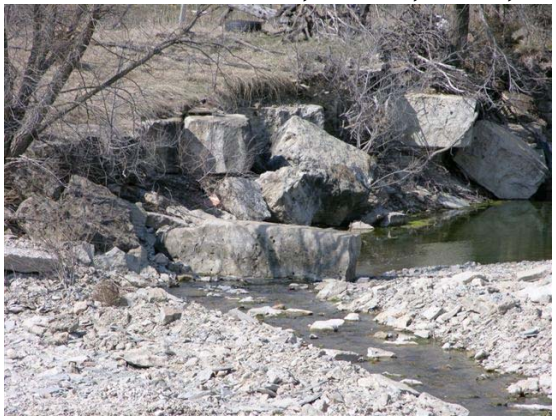


GE-66 = Barneston (Florence limestone) Limestone exposed in road cut on east side of Humboldt Creek Road, with base of Florence limestone at 428 m (1405 ft); one digital photo; approximately 2800 ft southwest of northeast corner Sec. 19, T.13S., R.8E., Geary Co., Kansas.



GE-67 = Barneston (Florence limestone) Limestone exposed in spillway of a pond on east side of McNeal Road, with base of Florence limestone at 422 m (1358 ft); one digital photo; near center of NE1/4, Sec. 13, T.13S., R.7E., Geary Co., Kansas.

GE-68 = Matfield (Kinney limestone) Shale exposed in west-facing bank of stream on east side of McNeal Road, with Kinney limestone at 405 m (1330 ft); one digital photo; near center of west line, NW1/4, SE1/4, Sec. 13, T.12S., .R.7E., Geary Co., Kansas.



GE-70 = Base of Barneston (Florence limestone) Limestone and Matfield (Blue Springs shale) Shale exposed in west-facing bank of stream east of Old Kansas Highway 18, with base of Florence limestone at 421 m (1380 ft); one digital photo; just north of center of SW1/4, NW1/4, Sec. 28, T.12S., R.8E., Geary Co., Kansas.

WOODBINE QUADRANGLE

Field work was conducted during January–March of 2007.

No data points were identified in the Geary Co., Kansas, part of this quadrangle.

SKIDDY QUADRANGLE

Field work was conducted during January–March of 2006.

GE-154 = Barneston (Florence limestone) Limestone and upper Matfield (Blue Springs shale) Shale exposed in road ditch on north side of Tri County Road, with base of Florence limestone at 380 m (1247 ft); Fort Riley limestone "rim rock" exposed in road at top of the hill near 396 m (1300 ft); thickness of Barneston Limestone from base of Florence limestone to base of "rim rock" is 13 m (44 ft); two digital photos; center of south line SE1/4, Sec. 32, T.13S., R.6E., Geary Co., Kansas.

GE-155 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in Tri County Road and field north of road, with base of "rim rock" at 340 m (1311 ft); two digital photos; center of south line, SW1/4, SE1/4, Sec. 33, T.13S., R.6E., Geary Co., KS.

GE-156 = Doyle (Towanda limestone) Shale exposed in road cut on north side of Tri County Road, with base of Towanda limestone at 408 m (1340 ft); lower Towanda limestone is 1.2 to 1.5 m (4 to 5 ft) of thin, platy to medium-bedded limestone that is vuggy and "rotten" in lower part, thicker middle bed is an opthalmid foraminiferal carbonate, upper beds are very thin, platy, and earthy; one digital photo; southeast corner, Sec. 32, T.13S., R.6E., Geary Co., Kansas.

GE-158 = Doyle (Towanda limestone) Shale exposed in road ditch on north side of Tri County Road, with base of Towanda limestone at 402 m (1320 ft); one digital photo; near center of south line, SE1/4, Sec. 36, T.13S., R.6E., Geary Co., Kansas.

WHITE CITY QUADRANGLE

Field work was conducted during January–March of 2006.

GE-135 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in gullies on both sides of Swenson Road, with base of "rim rock" at 422 m (1385 ft); one digital photo; near center of west line SW1/4, SW1/4, Sec. 33, T.13S., R.7E., Geary Co., Kansas.

GE-140 = Barneston (Fort Riley limestone "rim rock") Limestone exposed in gully northwest of section corner, with base of "rim rock" at 408 m (1340 ft); beds of upper Fort Riley limestone are more conspicuous here forming a second outcrop about 8 m (25 ft) above the "rim rock" that can be confused with "rim rock" proper; one digital photo; near center of west line SE1/4, SE1/4, SE1/4, Sec. 35, T.13S., R.6E., Geary Co., Kansas.

DWIGHT QUADRANGLE

Field work was conducted during January–March of 2005.

No data points were identified in the Geary Co., Kansas, part of this quadrangle.

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APPENDIX A. GPS Coordinates

Control Point	Latitude	Longitude
GE-1	39.06823162080	-96.53801286260
GE-2	39.06629015410	-96.57896814990
GE-3	39.06497233280	-96.57623381510
GE-4	38.90654471470	-96.52047319360
GE-5	38.91329706620	-96.52016122260
GE-6	38.92480417450	-96.52024754020
GE-7	38.98047470270	-96.51982096120
GE-8	39.00069535190	-96.52313440020
GE-9	39.00846300500	-96.53132271250
GE-10	39.01503832650	-96.53699381790
GE-11	39.07216030110	-96.53884904760
GE-12	39.05682252840	-96.53845102610
GE-13	39.03507267210	-96.53893221180
GE-14	39.02366259340	-96.53842844060
GE-15	39.02222680470	-96.53842567430
GE-16	39.01968433030	-96.53833949890
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GE-18	39.02467786710	-96.53877909340
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GE-20	39.01500209020	-96.53995585410
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GE-23	39.03379737390	-96.56163995270
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